Draft

STATUS REVIEW OF THE EASTERN DISTINCT POPULATION SEGMENT OF STELLER SEA LION (*Eumetopias jubatus*)

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National Oceanic and Atmospheric Administration

Cover photo: Steller sea lion (*Eumetopias jubatus*) adult female with pup photographed at Yasha Island in Southeast Alaska on August 23, 2006. Photo credit: Lauri A. Jemison, Alaska Department of Fish and Game. Research conducted under NOAA Permit No. 358-1769.

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EXECUTIVE SUMMARY

On June 29, 2010, the National Marine Fisheries Service (NMFS) provided notice it was initiating the first 5-year status review of the eastern DPS of Steller sea lion, listed as "threatened" under the Endangered Species Act (ESA) and opened a public comment period (75 FR 37385, June 29, 2010; 75 FR 38979, Wednesday, July 7, 2010). During the ensuing comment period, NMFS received two petitions to delist this DPS: from the States of Washington and Oregon; and from the State of Alaska. Both petitions contend the eastern DPS of Steller sea lions has recovered, is not in danger of extinction, and is not likely to be endangered in the foreseeable future. Based on the information presented and referenced in the petitions, as well as other information, NMFS found (75 FR 77602, December 13, 2010) the petitions presented substantial information indicating that the petitioned action may be warranted. NMFS provided notice that the Status Review of the eastern DPS was continuing to determine if the petitioned action is warranted. NMFS reopened the comment period twice: first in relation The Status Review and again after finding the petitioned action (de-listing) may be warranted. The final comment period in the process closed February 11, 2011.

A 5–year status review is a periodic process conducted to ensure that the listing classification of a species is accurate and is based on the best available scientific and commercial data. The Alaska Region has completed a draft Status Review for the eastern DPS of Steller sea lions following regulations implementing the ESA (50 CFR §424.10 and 424.11) and recommendations in NMFS finalized guidance on the content of 5-year reviews under the ESA. The evaluation considers both the biological (demographic) criterion and the threats-based ESA listing-factor criteria set forth in the Recovery Plan and the five listing factors included in section 4(a) of the ESA, which NMFS must consider when making a determination whether a species should be removed from the list of threatened species (16 U.S.C. 1533(c)(2)(B)). The Status Review considers the best available scientific and commercial information to determine if each recovery criterion listed in the NMFS 2008 Recovery Plan has, or has not, been met.

Demographic factor: The Status Review evaluates data on population status and trend summarized in the Recovery Plan as well as new survey data available since 2004 (most recent data available and used in the Recovery Plan). The review evaluates and draws conclusions about these data for each of the areas within the breeding range of the eastern DPS of Steller sea lion - Southeast Alaska, British Columbia, Washington, Oregon and California. The best available information indicates the eastern DPS has increased from an estimated 18,040 animals in 1979 to an estimated 63,488 animals in 2009; this is an average growth rate of 4.3% per year for 30 years (1979-2009). Moreover, given the observed data, the probability that the overall growth rate was >3.0% was 0.84 (NMML 2012).

Special attention is given to a lack of recolonization at the southernmost portion of the range (San Miguel Island rookery) and stability in the nonpup portion of the eastern DPS in central California. The Status Review finds this status is likely a response to a suite of factors including climate induced northward range shift, competition for space on land (haulouts and rookery sites), and possible competition for prey with other pinniped species. The Review evaluates recently updated population and genetic data to conclude the California portion of the eastern DPS does not "constitute a significant portion of the range" (this is preliminary, pending further regulatory and policy guidance per 75FR76987, December 9, 2011). The Status Review does not find it appropriate to further sub-divide the DPS or to retain current ESA measures to address solely the California portion of this DPS.

The Recovery Plan provides that the eastern DPS will be considered for removal from the list of threatened species when "[t]he population has increased at an average annual growth rate of 3% per year for 30 years." The review concludes this demographic criterion has been met.

ESA Listing Factors and Associated Criteria: The Status Review evaluates information contained in the Recovery Plan as well as newly available data for each of the following threat factors and the related criteria set forth in the Recovery Plan:

- The Present or Threatened Destruction, Modification, or Curtailment of a Species' Habitat or Range
- Overutilization for Commercial, Recreational, or Educational Purposes
- Diseases, Parasites, and Predation
- The Inadequacy of Existing Regulatory Mechanisms
- Other Natural or Anthropogenic Factors Affecting Its Continued Existence

After a thorough review of appropriate threats under each of these factors (e.g. global climate warming, ocean acidification, direct and indirect fisheries interactions, human disturbance from a variety of sources, toxic substances, subsistence taking, illegal direct killing, entanglement in nets and gear, disease, predation, removal of protections provided under the ESA, and others), this Status Review concludes the ESA listing factor criteria have been met and the eastern DPS of the Steller sea lion is not likely to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range due to any of the ESA listing factors.

Recovery Plan recommended de-listing actions: The Status Review concludes the recommended Recovery Plan actions are in place or have otherwise been met through current programs, projects and regulatory activities of existing legislation (e.g., the Marine Mammal Protection Act). In particular: mechanisms are in place to monitor and to respond to disease outbreaks (e.g., to phocine distemper virus, PDV) via existing functional Marine Mammal Standing Networks and the Unusual Mortality Event response), outreach programs exist, and a Steller sea lion coordinator is on staff at NMFS. The Alaska Region has worked with the State of Alaska to reach agreement "which describes their fishery management plan, minimizes the take of Steller sea lions, and describes how future actions taken by the State will comport with the ESA and the Marine Mammal Protection Act (MMPA)."

A key action recommended by the Recovery Plan was the development of a Post Delisting Monitoring Plan (PDMP) to guide monitoring activities for 10 years post delisting. The National Marine Mammal Laboratory has completed a draft PDMP, included as an Appendix to this document.

Status Review Conclusion: After a detailed review of the best available information since completion of the Recovery Plan, NMFS concludes the biological (demographic) criterion and ESA listing factor criteria set forth in the Recovery Plan for the eastern DPS of the Steller sea lion have been met. The analysis of possible threats under the ESA listing factors indicates none are likely to cause the eastern DPS of Steller sea lion to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range. In the event the eastern DPS is delisted, current measures under the MMPA, other laws, and regulations will provide the protection necessary to ensure the continued survival and recovery of the eastern DPS of Steller sea lions.

1 INTRODUCTION AND BACKGROUND

1.1 Introduction

The National Marine Fisheries Service (NMFS) has prepared this document to: a) provide our evaluation of the current status of the eastern Distinct Population Segment (DPS) of the Steller sea lion (*Eumetopias jubatus*); and b) provide our assessment of past, present, and likely future threats to this species. As part of this review, we provide a recommendation regarding its future ESA listing status. Preparation of the Status Review was announced with a notice in the Federal Register (75FR37385, June 29, 2010) and shortly thereafter (August 30, 2010) two petitions were submitted by the states of Washington/Oregon and Alaska to remove the eastern DPS of Steller sea lions from the list of threatened and endangered species under the Endangered Species Act (ESA) (http://www.alaskafisheries.noaa.gov/protectedresources/stellers/edps/status.htm). NMFS will decide whether to propose changes to the ESA listing status of this taxon after the review conducted by this document, a review of other relevant biological and threat information not included herein, consideration of efforts being made to protect the species, and a review of relevant laws, regulations, and policies. NMFS will announce this decision in the *Federal Register* and post it on the NMFS website (refer to: http://www.nmfs.noaa.gov/pr/species/).

NMFS and others have recently released documents that provide and synthesize a large amount of information concerning the life history, current status, and ecology of the Steller sea lion (e.g., Department of Fisheries and Oceans Canada (DFOC) 2011; NMML 1995, NMFS 2008, 2009, 2010a). Many of these documents also provide information about kinds, levels, and significance of impacts from various human and naturally-occurring threats to this species. NMFS refers readers to these documents for details beyond the level provided in this status review.

The conclusions within this document do not represent a decision by NMFS on whether this taxon should be removed from the list of threatened and endangered species.

1.2 ESA-Related Background

The ESA defines an endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range" (ESA section 3(6)). The ESA defines a threatened species as a species that is "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range (ESA section 3(19)). Section 4 of the ESA provides the basis for determining a species status under the Act. Under the ESA, a listing determination can address a species, subspecies, or a Distinct Population Segment (DPS) of a vertebrate species (16 U.S.C. 1532 (16)).

Under section 4(a)(1) of the ESA, NMFS must determine whether a species is threatened or endangered as a result of any one or a combination of the following factors:

(A) the present or threatened destruction, modification, or curtailment of its habitat or range;
(B) over-utilization for commercial, recreational, scientific, or educational purposes;
(C) disease or predation;
(D) the inadequacy of existing regulatory mechanisms; or
(E) other natural or manmade factors affecting its continued existence.

The agency determines whether or not a species should be listed solely on the basis of the best scientific and commercial data available, after conducting a review of the status of the species and taking into account efforts made by any state or foreign nation to protect such species.

Regulations implementing the ESA provide the rules for revising the Lists of Endangered and Threatened Wildlife and Plants and, where appropriate, designating or revising their critical habitats (50 CFR 424). The regulations provide criteria for determining species to be endangered or threatened and for designating critical habitats. The implementing regulations also contain the factors to consider for delisting a species (50 CFR 424.11(d)) which are the same five factors that the agency must consider when determining whether to list a species, as set forth above. A species may be delisted for one or more of the following reasons: the species is extinct; the species has recovered and is no longer endangered or threatened; or investigations show the best scientific or commercial data available when the species was listed, or the interpretation of such data, were in error (50 C.F.R. 424.11(d)(1)-(3)).

The ESA authorizes an interested person to petition for the listing or delisting of a species, subspecies, or DPS (16 U.S.C.1533(b)(3)(A). Part 424 also establishes procedures for receiving and considering petitions to revise the lists and for conducting periodic reviews of listed species (50 CFR 424.01). A 5–year status review is a periodic process conducted to ensure that the listing classification of a species is accurate and is based on the best available scientific and commercial data. On June 29, 2010, NMFS provided notice of the initiation of a 5-year status review of the eastern DPS of Steller sea lion under the ESA and opened a public comment period (75 FR 37385, June 29, 2010; 75 FR 38979, Wednesday, July 7, 2010). The comment period ended February 11, 2011.

1.3 ESA Listing History

On November 21, 1989, the Environmental Defense Fund, joined by 17 other organizations, petitioned NMFS to publish an emergency rule listing the Steller sea lion as an endangered species under the ESA and to begin rulemaking to make such listing permanent. On April 5, 1990 (55 FR 12645) NMFS issued an emergency interim rule that listed the Steller sea lion as a threatened species under the ESA, established protective interim measures, and requested public comment. In this emergency rule, NMFS summarized that "… the number of …sea lions observed on certain rookeries in Alaska declined by 63% since 1985 and by 82% since 1960. The declines are spreading to previously stable areas and accelerating…The cause(s) of these declines have not been determined..." (55 FR 49204). NMFS announced the implementation of the following emergency conservation measures in an attempt to aid recovery: 1) Initiation of a program to make monthly estimates of the level of incidental killing of Steller sea lions in certain fisheries by use of data from fishery observer programs with estimates of fishing effort; 2) Aggressive enforcement of the emergency regulation; 3) Establishment of a recovery program, including the establishment of a recovery team; 4) Prohibition of shooting near or at Steller sea lions; 5) Establishment of buffer zones around certain rookeries (none of the protected rookeries were within the breeding range of the eastern DPS); and 6) Establishment of a quota for lethal incidental take in fisheries west of 141 W longitude. NMFS corrected errors to this rule two weeks later (55 FR 17442). On April 10, 1990 (55 FR 13488), the Fish and Wildlife Service (FWS) took emergency action to add the Steller sea lion to the List of Endangered and Threatened Wildlife for 240 days. On July 20, 1990 NMFS took two actions related to protecting the Steller sea lion under the ESA: 1) It published a proposed rule to list the species as a threatened species under the ESA (55 FR 29793); and 2) NMFS issued (55 FR 29792) an advanced notice of proposed rulemaking that requested public comments to assist its efforts to designate critical habitat and to develop separate, more comprehensive, regulations to protect the species.

On November 26, 1990 (55 FR 49204) NMFS published a final rule to list the Steller sea lion as a threatened species under the ESA (a technical amendment to the rule was published on November 18, 1991: 56 FR 58184). On December 4, 1990, FWS published a final rule to make permanent the addition of the Steller sea lion to the List of Endangered and Threatened Wildlife (55 FR 50005). In the Final Rule to list, NMFS summarized that it was listing this species:

> because of significant declines in the Steller sea lion population. The number of Steller sea lions observed on certain rookeries in Alaska has declined by 63% since 1985 and by 82% since 1960. Declines are occurring in previously stable areas.

At the time of this listing, NMFS concluded that:

> NMFS must consider the status of the entire species, including areas where Steller sea lion abundance is increasing or not declining significantly, because there is not sufficient information to consider animals in different geographic regions as separate populations.

In 1997, based on demographic and genetic dissimilarities, NMFS identified two DPSs of Steller sea lions under the ESA: a western DPS and an eastern DPS (May 5, 1997, 62 FR 24345). Due to persistent decline, the western DPS was reclassified as endangered, while the increasing eastern DPS remained classified as threatened. FWS made this revision to the List on June 5, 1997 (62 FR 30772). Figure 1 depicts the geographical delineation of these two DPSs.

Federal Register documents for the Steller sea lion are publicly available (http://ecos.fws.gov) and *via* the NMFS Alaska Region http://www.alaskafisheries.noaa.gov/protectedresources/stellers/default.htm.

1.4 Steller Sea Lion Protective Measures and Critical Habitat Designation

NMFS established (50 CFR 227.12) protective measures for Steller sea lions "similar to those in the [1990] emergency interim rule" (55 FR 49209), including: 1) prohibiting shooting at or near Steller sea lions; 2) prohibiting, with limited exceptions, the entry of vessels within 3 nm of certain rookeries and the approach of individuals on land within 0.5 miles (0.8 km) or within sight of a listed rookery in the Gulf of Alaska and the Bering Sea/Aleutian Islands area; and 3) limited allowable annual take of Steller sea lions incidental to commercial fisheries to 675 animals in Alaskan waters and adjacent areas of the EEZ west of 141 W longitude.

Following listing, NMFS implemented further measures under the Magnuson Fishery Conservation and Management Act to reduce impacts on Steller sea lions, their prey and their habitat. Since these initial post-listing protection measures, NMFS has modified protection measures for Steller sea lions multiple times (see summary of history of protection measures in NMFS 2010). Many of the protections put into place since 2000 are measures intended to seasonally and spatially disperse fishery efforts and removals. These measures were primarily within the breeding range of the western DPS but include measures within areas in which individuals from the eastern DPS may feed.

Section 3 of the ESA clarifies that "The term "critical habitat" for a threatened or endangered species means—

> (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or

> biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species.

NMFS designated critical habitat for Steller sea lions on August 27, 1993 (58 FR 45269). At the time of designation, Steller sea lions were listed as a single species (not two DPSs) and, thus, the designation includes sites within the breeding range of both the western DPS (Figure 1.1) and the eastern DPS (Figure 1.2).

In the final rule that designated critical habitat for Steller sea lions (58 FR 45269), NMFS summarized that:

> The physical and biological habitat features that support reproduction, foraging, rest, and refuge are essential to the conservation of the Steller sea lion. For the Steller sea lion, essential habitat includes terrestrial, air and aquatic areas.

With respect to terrestrial critical habitats, NMFS differentiated between rookeries and haulouts. Rookeries are "…defined as those sites where males defend a territory and where pupping and mating occurs on a consistent annual basis." NMFS clarified that haulouts are "areas used for rest and refuge by all ages and both sexes of sea lions during the non-breeding season and by non-breeding adults and subadults during the breeding season." NMFS also recognized that sites used as rookeries during the breeding season may be used as haulouts at times of the year other than the breeding season. Citing Mate (1973), NMFS (58 CFR 45269) noted that the suitability of a particular area as a rookery or haulout is determined by factors such as "…substrate, exposure to wind and waves, the extent and type of human activities and disturbance in the region, and proximity to prey resource."

In identifying aquatic habitats as part of critical habitat, NMFS specifically highlighted several components of such habitats: nearshore waters around rookeries and haulouts, traditional rafting sites, food resources, and foraging habitats. NMFS designated critical habitat that includes marine waters within 20 nautical miles of rookeries and haulouts within the breeding range of the western DPS and within three special aquatic foraging areas in Alaska (50CFR226.202, a and c, respectively). NMFS designated critical habitat that includes marine waters within 3,000 feet of rookeries and haulouts in California and Oregon, and within the Alaska portion of the breeding range of the eastern DPS (50CFR226.202 a and b).

1.5 Recovery Planning, Criteria, and Priority

The eastern DPS of Steller sea lion has a recent, final, and approved Recovery Plan that contains objective, measurable criteria upon which to base decisions about its ESA listing status (NMFS 2008).

1.5.1 Recovery Planning

NMFS has formally undertaken recovery planning for Steller sea lions for over two decades including recovery planning specifically for the eastern DPS.

In March, 1990, NMFS convened a Steller Sea Lion Recovery Team (see summary in 55 FR 49204). This team drafted the first Recovery Plan which was released for public review and comment on March 15,

1991. The Final Steller Sea Lion Recovery Plan was finalized in December 1992 and released on January 7, 1993 (58 FR 3008). Because the entire species was listed as threatened under the ESA at that time, this recovery plan provided recovery tasks, reclassification criteria and delisting criteria for the species as a whole.

In 2001, NMFS assembled a new Steller Sea Lion Recovery Team (Team) to assist NMFS in revising and updating the Recovery Plan. NMFS released a Revised Final Recovery Plan for the Steller Sea Lion: Eastern and Western Distinct Population Segments (NMFS 2008).

With respect to the status of the eastern DPS of Steller sea lion, the Recovery Plan (NMFS, 2008: xiii) noted:

> …no threats to continued recovery were identified for the eastern DPS. Although several factors affecting the western DPS also affect the eastern DPS (e.g., environmental variability, killer whale predation, toxic substances, disturbance, shooting), these threats do not appear to be at a level sufficient to keep this population from continuing to recover, given the long term sustained growth of the population as a whole. However, concerns exist regarding global climate change and the potential for the southern part of the range (i.e., California) to be adversely affected. Future monitoring should target this southern portion of the range… The eastern DPS has been recovering…since the late 1970s and should be considered for removal from the List.

The Recovery Plan identified two recovery actions for the eastern DPS: 1) Monitoring; and 2) Protection from other natural or anthropogenic factors and administration of the recovery program. The key monitoring task identified in the Recovery Plan was the development of a post delisting monitoring plan which would guide monitoring activities for 10 years post delisting. NMFS (2008) stated that the objectives of this monitoring plan were to ensure that necessary recovery actions remain in place and that NMFS could confirm that there are no threats to the population's continued existence. NMFS has developed such a monitoring plan. The specific task identified under the second general recovery action for the eastern DPS was the initiation of a status review to determine whether to delist this DPS.

1.5.2 Existence and Adequacy of Recovery Criteria

In the revised Final Recovery Plan for the Eastern and Western DPS of Steller Sea Lion, NMFS (2008) identified specific objective and measurable recovery criteria that comprise the core standards upon which to base decisions about whether the eastern DPS of Steller sea lion should be delisted. These criteria were developed with the assistance of the Steller Sea Lion Recovery Team. NMFS (2008a: VII-2) clarified that:

> The ESA requires that recovery plans, to the maximum extent practicable, incorporate objective, measurable criteria which, when met, would result in a determination in accordance with the provisions of the ESA that the species be removed from the List (50 CFR 17.11 and 17.12). The recovery criteria comprise the core standards upon which the decision to delist a species will be based.
>
> To remove the eastern DPS of Steller sea lion from the List, NMFS must determine that the species' abundance, survival, and distribution, taken together with the threats (i.e., ESA listing factors), no longer render the species "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range."

> Any new factors identified since listing must also be addressed in this analysis to ensure that the species no longer requires protection under the ESA.
>
> Recovery criteria must include the elimination of threats to the species as well as measures of demographic health. Both sets of criteria serve as checks on one another – one set of criteria requires evidence that the threats to Steller sea lions have been eliminated or controlled and are not likely to recur (listing factor criteria), and the other set of criteria requires evidence that the population status of Steller sea lions has improved in response to the reduction in threats (biological criteria).

During the process of developing the Recovery Criteria, the Recovery Team recommended, and NMFS contracted for, a population viability analysis (PVA) (Goodman 2006, Appendix to NMFS 2008) to estimate the risk of extinction of the two DPSs based on recovery scenarios. However, the Recovery Plan clarifies that while the PVA analysis and the process of going through the analysis helped the Recovery Team focus on development of the criteria, the biological recovery criteria were not developed directly from the PVA. Rather, a weight of evidence approach was adopted. The Recovery Plan specified that a weight of evidence approach included: 1) the review and synthesis of all available biological and ecological information; 2) the determination of key demographic parameters and other factors that would indicate the species is no longer at risk of extinction, including the performance of the population over a substantial time period and a demonstration of a reduction of threats as identified in the Recovery Plan (NMFS 2008).

Before being completed, the draft Recovery Plan underwent independent peer review (undertaken through the Center for Independent Experts) and was also available for public comment. The results of these reviews are publically available (http://www.alaskafisheries.noaa.gov/protectedresources/stellers/recovery.htm). In general, the peer review comments indicated that the weight of evidence approach to recovery criteria was appropriate and supported the recovery criteria for the eastern DPS.

Based on the rationale presented in the 2008 Recovery Plan (NMFS 2008), as well as our review of the aforementioned recovery criteria, peer reviews, and new information that has become available since NMFS issued the 2008 Recovery Plan, we conclude that the recovery criteria are based upon or are consistent with consideration of the best available and the most up-to date information on the biology of the species and its habitat. The recovery criteria also address all of the five listing factors that are relevant to the species and provide an appropriate framework in which to consider new information regarding existing or new threats.

The Recovery Plan notes: "the Eastern DPS of Steller sea lion will be considered for delisting if all the following conditions are met:

1. The population has increased at an average annual growth rate of 3 percent per year for 30 years.

2. The ESA listing factor criteria are met" (NMFS 2008:viv).

NMFS provided specific delisting criteria for some of the listing factors (see Section 4). Thus, the specified recovery criteria seek to ensure that threats to population viability have been eliminated and that there is strong evidence of demographic health; which was determined to include an average

annual growth rate of 3%/yr for 30 years. The requirement for a sustained period of overall increase in abundance provides confidence not only that the trend is sustained but that the population is resilient, at least to the level of environmental change that has occurred over that time frame (30 years).

We discuss the delisting criteria in more detail in Section 4, below.

1.6 Status Review History and Receipt of Petitions to Delist

To determine whether a change in classification to endangered was warranted, NMFS initiated a status review of Steller sea lions on November 1, 1993 (58 FR 58318). NMFS (62 FR 24346) determined that:

> To complete the status review…population viability analyses…were only necessary for the western population segment, because the eastern population segment is likely to maintain current abundance for the foreseeable future.

This status review was completed in February 1995 (NMML 1995) and based on the review, NMFS concluded that genotypic dissimilarities as well as associated distributional, population response, and phenotypic information indicated that there were two DPSs of Steller sea lions, including an eastern DPS, the breeding range of which extended from southeastern Alaska to California. Several key conclusions from this review are relevant to the eastern DPS (NMFS 1995ii-iii):

> The United States (U.S.) population of Steller sea lions…, which numbered close to 192,000 adults and juveniles (non-pups) 30 years ago, declined by 64% to less than 69,100 non-pups by 1989…Most of this decline occurred in southwestern Alaska…Numbers in southeast Alaska, Oregon, and northern California remained stable, although declines have continued in central California…Southeast Alaska and Oregon pup production also remained stable.
>
> The eastern stock is expected to remain stable or increase for the foreseeable future if past population trends continue…
>
> …After 100 years, the only Steller sea lions remaining in U. S. waters may be restricted to the area from Southeast Alaska through northern California.

NMFS retained the threatened listing for the eastern DPS.

During the initial comment period following the initiation of the 5-year review of the eastern DPS, NMFS received two petitions to delist this species: On August 30, 2010 from the States of Washington and Oregon; and on September 1, 2010 from the State of Alaska. Both petitions contended that the eastern DPS of Steller sea lions has recovered, is not in danger of extinction, and is not likely to become in danger of extinction for the foreseeable future. NMFS considered these two petitions jointly in making the required 90-day finding. In this finding, NMFS (2010b) summarized that both petitions made multiple references to statements, information, and conclusions from the Revised Final Recovery Plan (NMFS 2008), and literature cited within this document. For example, the State of Alaska petition called attention to the NMFS Recovery Plan conclusion that:

> [n]o threats to recovery [of the Eastern DPS of the Steller sea lion] have been identified and the population has been increasing for over 25 years, new rookeries have been created, and the population is at historical high levels. 2008 Recovery Plan at VII–7.

NMFS (2010 b) also summarized that the petitions provided new information not available at the time of the 2008 Recovery Plan, but that was readily available in NMFS files at the time of receipt of the petitions (e.g., a recently published paper: Boyd 2010; new aerial survey data). Lastly, the petitions presented new information that was not readily available in NMFS files (NMFS 2010b).

Based on the information presented and referenced in the petition, as well as all other information readily available in NMFS files, on December 13, 2010 (75 FR 77602) NMFS found that the petitions present substantial information indicating that the petitioned action may be warranted. NMFS provided notice that the status review of the eastern DPS was continuing to determine if the petitioned action is warranted. The comment period related to this status review closed on February 11, 2010.

2 SPECIES DELINEATION AND APPLICATION OF THE 1996 DISTINCT POPULATION SEGMENT (DPS) POLICY

A key task in any ESA status review is the delineation of the biological entity whose status it is appropriate to consider under the ESA. The ESA defines a "species" to include:

> …any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife which interbreeds when mature.

Thus, an ESA-listing (or delisting) determination can address a species, subspecies, or a DPS of a vertebrate species (16 U.S.C. 1532 (16)).

The 1996 policy provides that "(T)hree elements are considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act. These are applied similarly for addition to the lists of endangered and threatened wildlife and plants, reclassification, and removal from the lists:

1. Discreteness of the population segment in relation to the remainder of the species to which it belongs;
2. The significance of the population segment to the species to which it belongs; and
3. The population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).

The Alaska Region NMFS (AKR) received the Alaska Fishery Science Center's (AFSC) evaluation of whether the eastern DPS continues to meet the criteria for a valid distinct population segment under the 1996 DPS policy on May 6, 2011 (Appendix 1A). AKR has incorporated the AFSC's DPS (AFSC 2011) evaluation as part of this status review and provides the evaluation in its entirety in Appendix 1B. The AFSC concluded that the eastern DPS of Steller sea lions, as currently delineated:

> does meet the criteria of a DPS and therefore this population is able to be considered discrete for the purposes of listing, delisting, and reclassifying.

The AFSC (2011) concluded that:

- Sea lion movement data corroborate extensive finding from genetics research indicating there has been strong separation between the two currently recognized DPSs.

- The area in which there is movement of western DPS animals into the eastern DPS range is small. While there is no evidence to suggest such a rate of exchange is sufficient to merge distinct populations, it may be sufficient to prevent genetic differentiation among populations within a DPS (such as within the entire eastern DPS).
- There is an "overwhelming collection of morphological, ecological and behavioral, and genetic evidence for DPS indicating the eastern and western DPSs remain discrete entities.
- Interbreeding along a contact zone such as now occurs near the DPS boundary is not unexpected.
- The 1996 policy (61 FR 47222) makes it clear that "*The Services do not consider it appropriate to require absolute reproductive isolation as a prerequisite to recognizing a distinct population segment*".
- The recognition of two DPSs is also supported by the published recommendation (Phillips et al. 2009*a*) and recognition for subspecies designation of the two distinct population segments (e.g, by the Taxonomic Committee of the Society for Marine Mammalogy (http://www.marinemammalscience.org/index.php?option=com_content&view=article&id=420&Itemid=340).

With respect to discreteness, the AFSC (2011) found that "…the persistent population trend trajectories combined with the physical and physiological differences, and behavioral characteristics unique to each DPS indicate that all of the potential factors in the discreteness criteria contribute to this continued separation and as such the population segment as described for this status review should be considered discrete."

The AFSC (2011) also concluded that the current conservation and management plan for Steller sea lions in Canada (where part of this species resides and where some individuals that breed in the U.S. spend part of the year) is similar to the protection measures provided by the U.S. Marine Mammal Protection Act, and thus, that the population segment is not delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

With respect to the significance of the eastern DPS as currently identified, the AFSC (2011) concluded:

- There is evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.
- The loss of the DPS would result in a significant gap in its range.
- The ecological setting of southeast Alaska, British Columbia, and southward to Central California is unique but that with almost one half of the global population residing in the area, it is not unusual.
- There is no evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.

In the memo transmitting the AFSC (2011) evaluation, DeMaster (2011; see Appendix 1A) noted:

> The AFSC has completed a thorough review of the best available scientific information and has determined that the eastern DPS of Steller sea lions, as currently designated under the ESA, does satisfy the first condition of the policy for discreteness (61 FR 4722). The eastern DPS of Steller sea lions comprise a distinct population segment as defined under the ESA and the eastern DPS is

significant to the taxon. This conclusion is based on an extensive body of research that includes sea lion population genetics, ecology, behavior, and details regarding the physical and physiological characteristics of the species.

Based on the information and arguments contained in Appendix 1B, summarized above, in which the best available relevant information is presented and evaluated, NMFS concludes that the eastern DPS of Steller sea lions, as currently identified, is a valid DPS for consideration under the ESA. Thus, we focus our review on evaluating the DPS of this currently listed entity.

3 SPECIES BACKGROUND

In this section of the status review, NMFS summarizes natural history, biological, ecological and other information about the eastern DPS that it has determined is valuable for describing the taxon under review and especially, that it has determined is valuable to understanding its current status and how it may be affected by factors that could potentially threaten its long term existence. Considerable detail is provided in the Recovery Plan (NMFS 2008), COSEWIC (2003), DFOC (2010), NMFS (2010) and other documents. Readers are referred to Loughlin et al. (1987) and Hoover (1988) for more detail regarding physical descriptions, behavior, and basic biology.

3.1 Species Description and Taxonomy

Taxonomically, Steller sea lions are classified within the Order Carnivora, Suborder Pinnipedia, Family Otariidae, and Subfamily Otariinae. The Steller sea lion is the only extant representative of its genus, *Eumetopias (*NMFS 2008; Rice 1998).

The eastern DPS of Steller sea lion is one of two distinct population segments, as defined under the ESA, that comprise the biological species known as the Steller sea lion (*Eumetopias jubatus*). The species is also sometimes called the “Northern sea lion” or Steller’s sea lion. Recent analyses have concluded the eastern DPS comprises a separate subspecies, *E. j. monteriensis* (Gray, 1859) Loughlin's northern sea lion (Phillips et al 2009b; Committee on Taxonomy 2011).

3.2 Current and Historical Distribution

The current worldwide breeding range of the Steller sea lion extends around the North Pacific Ocean rim from northern Japan, the Kuril Islands and Okhotsk Sea, through the Aleutian Islands and Bering Sea, along Alaska's southern coast, and south to California (Figure 1) (Kenyon and Rice 1961, Loughlin et al. 1984, 1992; Burkanov and Loughlin 2005, NMFS 2008, DFOC2011). The most northern rookery is Seal Rocks (60°09'N), located at the entrance to Prince William Sound, Alaska (58 FR 45269). Currently, Año Nuevo Island off central California is the southernmost rookery (37°06'N) (58 FR 45269). However, until 1981, Steller sea lions bred farther south on the Channel Islands at San Miguel Island (34°05'N) (Bartholomew and Boolootian 1960; DeLong and Melin 2000) and may have briefly held a rookery at the west end of Santa Cruz Island in 1930 (Bonnot 1931). Thus the overall range of the eastern DPS of Steller sea lion is large, occupying a span of coastline of about 2400 km (Pitcher et al. 2007).

The eastern DPS includes sea lions born on rookeries from California north through Southeast Alaska (Figures 3.1-3.3). With the reclassification into a western and eastern DPS (62 FR 24345, May 5, 1997),

NMFS recognized the division between the eastern and western DPSs to be at Cape Suckling (144º west longitude) in the northeast Gulf of Alaska (see Figure 1). Appendix 1B contains a thorough description of the population structure, particularly as it relates to the discreteness and significance of the eastern DPS.

3.2.1 Habitat Types and Locations

As described in the Final Rule designating critical habitat (58 FR 45269) and as summarized in Section 1.4, Steller sea lion critical habitat throughout their range includes terrestrial, aquatic, and the area above (in air) that support reproduction, rest, foraging, and refuge. Terrestrial sites used by Steller sea lions as rookeries and haulouts are widespread throughout the range and the locations used year-to-year vary little (58 FR 45269). More specific discussion about the nature of important features of Steller sea lion habitat can be found in Call and Loughlin (2005) and Ban and Trites (2007).

In this status review, our use of the term rookery follows NMFS (58 FR 45269):

> those sites where males defend a territory and where pupping and mating occurs on a consistent basis.

We follow the convention adopted in the Recovery Plan (NMFS 2008 and Pitcher et al. 2007), limiting the use of the term "rookery" to a site where a count of animals on a site generally reports greater than 50 pups are being born per year.

Within the eastern DPS, breeding currently occurs at 15 major rookeries (sites with >50 pups) (Pitcher et al. 2007; Olesiuk 2008, NMFS 2008). Pitcher et al. (2007:112) summarized that during the breeding season, there are about 59 major haulout sites used by nonbreeding animals, plus seasonal and numerous smaller haulouts. NMFS (2008a:25) summarized that "about 85 major haulout sites currently exist from Cape Fairweather (58.8°N, 137.9°W) to Año Nuevo Island (37.1°N, 122.3°W)". This number includes rookery sites used as haulouts during the non-breeding season. Figures 3.1-3.3 depict the locations of the rookeries and haulouts. Between Orford Reef in Oregon and the northern end of Vancouver Island, a stretch of coastline more than 600 miles long, there are currently no breeding rookeries. However, the WDF&W (ODFW and WDFW 2010:2) has observed "…increasing numbers of newborn pups at several locations…" along the Washington coast.

Pitcher et al. (2007:111) summarized that "…there is a general consensus that the breeding range" of the eastern DPS "has shifted" north. This shift began at the southern end of the range in the 1930s with the decline of the southern California rookery on San Miguel Island and continued in the 1960s and 1970s when the number of Steller sea lions at central California sites declined (Pitcher et al. 2007). At the northern end of the range, Steller sea lions established rookeries in southeast Alaska on Forrester Island in the 1950s, Hazy Island in the 1980s, and on White Sisters, Biali Rock and Graves Rock in the 1990s. In the 1920s, the center of the breeding population was at approximately 46°N (Washington-Oregon border), but by 2002, it had moved northward over 400 miles to the central British Columbia coast. However, the northward shift in the center of the eastern DPS breeding population is not entirely due to movement of eastern DPS animals. Based on genetic analyses of samples collected from new born pups in 2002 (Gelatt et al. 2007), western DPS females gave birth to about half of the pups born on White Sisters and about 70% of those on Graves Rock. Over the last 13 years (1996-2009), the regional distribution of pup production within the eastern DPS has changed only slightly: in 1996, 79% of all eastern DPS pups were born on northern rookeries in southeast Alaska and British Columbia, while the remaining 21% were born on southern rookeries in Oregon and California; in 2009, northern rookeries

produced 83% and the southern rookeries 17%. Consequently, it appears that most of the northern shift in the distribution of pup production within the eastern DPS occurred during the period from the 1930s through the early 1990s. Since the mid-1990s, pup production in both the northern and southern portions of the eastern DPS has increased significantly.

Steller sea lions use aquatic portions of their habitat for foraging, resting, and for traveling. As summarized recently (NMFS 2010: xxxii):

> Prey resources are the most essential feature of marine critical habitat for Steller sea lions. The status of critical habitat is best described as the status and availability of the important prey resources contained within [marine waters adjacent to major haulouts and rookeries], which include pollock, Atka mackerel, salmon, Pacific cod, arrowtooth flounder, Irish lord, rock sole, snailfish, herring, capelin, sand lance, other forage fish, squid, and octopus. Dominant prey items vary with region and season.

Studies conducted by Greger and Trites (2008) and Lander et al. (2009) provide thorough reviews and quantitative based discussions concerning important features of Steller sea lion aquatic habitat.

3.2.2 Movements

Information about movement patterns is important for understanding the nature and extent that local and range wide threats may have on eastern DPS animals. This information comes from mark-resight studies of animals branded as pups (e.g., Raum-Suryan *et al*. 2002; Scordino 2006; L. Jemison unpublished data) and from animals instrumented with a variety of electronic tags (e.g., Merrick and Loughlin 1997; Baba et al. 2000; Loughlin et al. 2003; Raum-Suryan et al. 2004; NMML unpublished data).

During the pupping and breeding season, which varies somewhat with latitude but extends from late May to early July (Pitcher and Calkins 1981, Gisiner 1985, Pitcher et al. 2001), most adult Steller sea lions occupy rookeries typically on islands or offshore reefs. While some juveniles and non-breeding adults occur at or near the rookeries during the breeding season, most are on haulouts or are at sea foraging. After the breeding season, animals may disperse from the rookery at which they breed.

Steller sea lions are not known to make regular migrations. However, while some individuals are able to move large distances, others may occupy relatively restricted regions depending on age, sex, and season (Mate 1973; Baba *et al.* 2000; Raum-Suryan et al. 2002, 2004; Scordino 2006). Womble et al. (2005) described a seasonal dispersion of Steller sea lions from offshore breeding areas of Southeast Alaska to the inner waterways of the region. These movements were associated with seasonal aggregations of high energy prey such as herring and eulachon. Thus, these patterns result in varied exposure to threats acquired both adjacent to rookery and haulout sites over months or years, as well as at distant coastal sites or offshore regions used for short term seasonal feeding.

For example, adult males have been seen over 1000 km from where they held a territory earlier in the same year (also their natal rookery) (Mate 1973; Scordino 2006). In contrast, Raum-Suryan et al. (2004) noted "…nearshore areas adjacent to haulouts are critical to the developing juvenile" as 90% of round trips were $\leq$ 15 km from haul-outs and 84% were < 20 hours in length. Thus, when young animals were using a particular haulout, they did not travel far or stay at sea very long (Raum-Suryan et al. 2004:823). These data indicate that potential threats near haulouts (e.g., human disturbance, predation, intensive prey removals) are of particular relevance to developing juveniles.

The picture is further complicated because females with their pups are known to disperse from rookeries from August-October (Calkins and Pitcher 1982; Merrick et al. 1988; Raum-Suryan et al. 2002; Scordino 2006). In Oregon and northern California, Scordino (2006:21) reported a "marked pattern in seasonal abundance and distribution" of females with a decline in the abundance of females and pups in both Oregon and northern California through the fall "…as many individuals traveled north beyond the Oregon border." Hence, potential threats to Steller sea lions occurring in regions far to the north of Oregon in the winter may affect individuals that breed in northern California and Oregon in the spring and summer.

Both pups and juvenile Steller sea lions can be impacted by threats far from where they are born. Based on analysis of resights of 8,596 pups branded on their natal rookeries in Alaska from 1975-1995, Raum-Suryan *et al*. (2002) found that by five months of age, pups can move over 400 km from natal rookeries. Based on resights of pups branded between 2003-2005, Scordino (2006) found that most pups from Northern California and Southern Oregon remained close to their natal rookery but 9-22% dispersed farther than 500 km. One-year olds moved further than pups and by three years of age, males dispersed greater distances than females. Pups branded on their natal rookeries in British Columbia (Fisher 1981) have been seen at Cape Saint Elias, Alaska (within the range of the western DPS); pups branded in the Gulf of Alaska have been sighted in Southeast Alaska and British Columbia; and some marked in Oregon have been seen in northern California, Washington, British Columbia, Southeast Alaska, and the Gulf of Alaska (Chiswell Island) within the range of the western DPS (Calkins and Pitcher 1982, Calkins 1986, Loughlin 1997; Scordino 2006).

Juvenile Steller sea lions often disperse widely, including documented movements up to 1,785 km from their natal rookeries (Raum-Suryan et al. 2002). Typically all long distance movements (those greater than 500 km) of juveniles were by males (Raum-Suryan et al. 2004).

Movement across the eastern DPS/western DPS boundary by animals (particularly juveniles) from both populations occurs (Raum-Suryan *et al.* 2002, 2004; Gelatt et al. 2007; Scordino 2006; Pitcher et al. 2007). AFSC (2011) summarized unpublished Alaska Department of Fish and Game (ADFG) mark-resight data for 2,000 pups marked on eastern DPS rookeries from 2001-2005. Of the 107 individual sea lions that traveled to the western DPS from the eastern DPS, only two were females: one returned to her natal rookery, the other traveled west at one year of age, but has not been resighted since. These data imply that eastern DPS males are more likely to be exposed than eastern DPS females to threats within the breeding range of the western DPS.

3.3 Foraging Ecology

Knowledge of the general foraging ecology of Steller sea lions and the particular foraging habits and ecology of the eastern DPS (to the extent that this is known), helps evaluate potential threats to that population. Some threats may indirectly affect sea lions by adversely affecting the physical characteristics of feeding habitat (e.g., changes in temperature or acidity that affect prey species distribution, survival, or reproduction) and/or through more direct impacts on the composition, abundance or seasonal and temporal distribution of prey species (e.g., due to pollution and fishery-related removals). The following summary is relevant to understanding how threats (e.g., human disturbance, climate change, fisheries affects) on Steller sea lion prey might influence population growth and recovery of the eastern DPS. For a wealth of additional details on this subject and a broad review of the nutritional stress concept relevant to Steller sea lions are provided in NMFS (1992, 1998a, 2000, 2001, 2008, and 2010).

Steller sea lion diet is a function both of local abundance and the ability of the individual (e.g., due to age and/or constraints due to pup rearing) to access prey. Available data indicate that Steller sea lions forage on a wide variety of demersal, semi-demersal, and pelagic prey, including many species of fish and cephalopods with regional differences (Gentry and Johnson 1981; Pitcher 1981, Pitcher and Fay 1982, Calkins 1988, Calkins and Goodwin 1988, Daniel and Schneeweis 1992; Merrick and Calkins, 1996; Sinclair and Zeppelin 2002; Womble and Sigler 2006; Gende and Sigler 2006; Waite and Burkanov 2006; Trites et al. 2007a) and occasionally eat other marine mammals and birds. NMFS (2000, 2008, 2010) and Trites et al. (2007a) provide lists of prey known to be consumed. This generalist foraging capability buffers, but does not eliminate the sensitivity of Steller sea lions to reductions or changes in distribution in a single species of prey in a given area. Such sensitivity is likely affected by availability of other prey at a given location, the cost of acquiring such alternate prey, and the nutritional benefits they derive from consuming it.

Nutritional requirements vary with age as the diving ability develops over time in young animals and limits foraging ability until animals are proficient divers (e.g., Merrick and Loughlin, 1997; Swain and Calkins, 1997). For example, pups grow rapidly and mothers must supply them with a large amount of energy (e.g., Higgins et al. 1988; Winship et al. 2001; 2002). Estimates indicate that lactating females may need to consume about 70% more food in order to provide all of her pup's nutrition over its first year (Winship et al. 2002). As young animals become more independent, food consumption increases with age and varies with sex (males eating more than females) (Kastelein et al. 1990).

The foraging strategies of Steller sea lions vary by sub-region, and certainly also vary by gender of the animal, season of year, and age (NMFS 2010). There are seasonal changes in foraging distances, probably related to prey availability (e.g., Merrick 1995; Womble et al. 2009) and prey movements (e.g., Loughlin 1993; Sigler et al. 2007). This variability in foraging strategies, distances, etc., is almost certainly related to the fact that the abundance, distribution, quality, and in some cases the nutritional value, of prey available to Steller sea lions also varies geographically, seasonally, among years, and may vary relative to the life stage and sex (e.g., pup, juvenile, non-reproducing adult, pregnant or nursing female, etc.) of the individual animal (see Rosen 2009).

The relative importance of different species in the diet differs throughout the range (e.g., Trites et al. 2007a). In the Gulf of Alaska (a location where some eastern DPS animals travel to feed), Merrick and Loughlin (1997) characterized sea lion diet as approximately 66.5% gadoids (pollock, Pacific cod, Pacific hake, and unidentified gadoids); 20.3% Pacific salmon; 6.1 % small schooling fish; 3.9 % flatfish; 2.9 % squid or octopus; and 0.3 % Atka mackerel. The diet of Steller sea lions in Southeast Alaska in the 1990s included more than 61 species of prey and was more diverse than in any other part of Alaska (Trites et al. 2007) and more diverse in summer than fall. Steller sea lion prey in southeast Alaska included: walleye pollock (*Theragra chalcogramma*), Pacific herring (*Clupea pallasii*), Pacific sand lance (*Ammodytes hexapterus*), Pacific salmon (Salmonidae), arrowtooth flounder (*Atheresthes stomias),* rockfish (*Sebastes* spp.), skates (Rajidae), and cephalopods (squid and octopus). Pollock has been more frequently observed in the diet of sea lions from the inside waters of southeast Alaska than anywhere else in Alaska (Sigler et al. 2009). Summer diet in British Columbia includes forage fish such as herring, sandlance and sardines, as well as mid-sized schooling fish such as salmon, hake, and rockfish (DFOC 2010).

Many Steller sea lion prey species seasonally form large aggregations after migrating from pelagic to nearshore waters to spawn. Salmon, herring, Pacific cod, capelin, eulachon, and other species, tend to have localized and highly seasonal patterns of abundance. Other species, such as cephalopods, pollock,

sand lance, arrowtooth flounder, and rock sole, may be available year round in many locations (e.g., see Calkins and Goodwin 1988; Sinclair and Zepplin 2002; Trites et al 2007a; Womble and Sigler 2006) but their nutritional value may vary seasonally (e.g., based on whether they are spawning or not).

3.4 Reproductive Biology

Steller sea lions typically breed and pup at remote sites (rookeries) at which sexually and physically mature males compete for territories and access to females. They have a polygynous mating system.

Male Steller sea lions become sexually mature between three and seven years of age. Males may become territorial at 10 and 11 years of age (Calkins and Pitcher 1982). Breeding males set up territories in May (Pitcher and Calkins 1981) and females, most of whom return to breed at their natal rookery, begin to arrive shortly thereafter (Gentry 1970, Higgins 1984, Merrick 1987). Most males do not defend a territory for more than 3 years, although they may return for up to 7 years (Gisiner 1985). The breeding sex ratio of females to males is often summarized to be about 10-15:1 (Gisiner 1985; Merrick 1987).

Female Steller sea lion become sexually mature between three and six years of age; they may still reproduce into their early 20s (Mathisen et al. 1962; Pitcher and Calkins 1981). Pitcher and Calkins (1981) concluded that adult females normally ovulate once each year and that most breed annually. However, Steller sea lion females may experience reproductive failures so such breeding may not always result in a surviving pup, especially during periods of nutritional stress (Pitcher et al 1981).

Pregnant females typically give birth to one pup within a few days of arriving on the rookery. About 90% of pups within a given rookery are born within a 25-day period (Pitcher et al 2001). Because pupping is so highly synchronous there are temporal periods of high vulnerability to stressors, such as disturbance or fluctuations in prey availability. Pupping occurs from late May to early July and peaks in June (Pike and Maxwell 1958, Mathisen et al. 1962, Gentry 1970, Pitcher and Calkins 1981, Bigg 1985; Pitcher et al. 2002). The mean date of pupping varies throughout the range of the eastern DPS, but not in a linear fashion with latitude. Pitcher et al. (2001) reported that the earliest mean pupping date occurred at Forrester Island in southeast Alaska and that the mean date becomes progressively later both south and north of this location, and with the latest mean date at Año Nuevo in California. They hypothesized that female nutritional status likely explains the differences in pupping times at individual rookeries but that the mean timing of births at rookeries was determined by the availability of prey near rookeries and weather conditions favorable for pup survival.

For roughly the first week following birth, mothers stay with and nurse their pups on the rookery. After this time, they go on regular foraging trips, the length of which can also be highly variable, depending on geographic location (Higgins et al. 1988, Hood and Ono 1997, Brandon 2000). Females typically breed about 11 days after they pup. Implantation of the blastocyst is delayed until about 3.5 months after breeding.

Pups first enter the water at about 2–4 weeks of age (Sandegren 1970) and can swim in the open ocean at about 4 weeks of age. Pups begin to disperse (with their mothers) from rookeries to haulouts between 2-3 months of age (Raum-Suryan et al. 2002; Scordino 2006). Most pups are weaned in their first or second year, but some may nurse into their third year (Pitcher and Calkins 1981; Porter 1997; Loughlin 1998; Trites and Porter 2002; Trites et al. 2006; summarized in NMFS 2008). Trites et al. (2006) reported that the proportion of time that Steller sea lion pups nursed declined through the spring to early summer suggesting that sea lion pups began supplementing their milk diet with solid food in the spring. They

concluded that weaning appears to typically occur at the start of the breeding season when pups are one or two years old. No sea lions were observed to be weaned during the winter. Observations made in Southeast Alaska found that offspring sex may affect the length of lactation - most male sea lions were weaned at two years of age whereas about 50% of females weaned at 1 year and the remainder at 2 years of age (Trites et al. 2006).

It is unclear how pup dependency may be affected by the body condition of the mother and/or the pup, pup birth weight or growth rates, or related to the availability of prey resources. Merrick et al. (1995) found that pup sizes were not related to local trends in abundance. Rather, pups grew faster (Brandon and Davis 1999) and 2-4 week old pups weighed more at (western DPS) declining rookeries in the Gulf of Alaska and Aleutian Islands than at stable or increasing rookeries in Southeast Alaska (eastern DPS), and, in the case of pup weight, in Oregon. However, Fadely and Loughlin (2001) found that in the late 1990s the relationship between pup condition and growth rate was weak and not consistent, throughout the range (of the wDPS).

3.5 Historic and Current Abundance and Productivity

This section provides abundance estimates, non-pup trend data, and data available about pup production for the eastern DPS of Steller sea lion. These data, coupled with data on historic, and especially current, pup production, provide insight into whether recovery in abundance has been achieved and is likely to continue for the foreseeable future given assumptions about current and possible future threats.

In the Recovery Plan, NMFS (2008) reviewed available historical records of Steller sea lion abundance within the eastern DPS "...in an attempt to relate current population size with levels prior to the initiation of standardized surveys." NMFS (2008) noted that this task is difficult because historic counts are not directly comparable to current counts, having been collected using a variety of methods and at varying times of the year (Pitcher et al. 2007). Hence, NMFS (2008) did not subject counts in U.S. waters prior to the 1970s to quantitative analyses.

NMFS's (2008) analyses and conclusions for the eastern DPS relied heavily on the comprehensive evaluation of abundance and trend (between the late 1970s and 2004) presented in Pitcher et al. (2007). Updated information is provided below, as available.

NMFS currently monitors Steller sea lion status in Alaska by counting animals during the breeding season at trend sites in conjunction with State and other partners. Trend sites are a set of terrestrial rookeries and haulouts where surveys have been consistently undertaken for many years (NMFS 2008, 2010). These counts are accomplished at varying intervals throughout the range. Two types of counts are used to study trend in Steller sea lion populations: counts of pups of up to 1 month of age and counts of non-pups (1+ year olds) (Pitcher et al. 2007; Olesiuk et al 2008; DeMaster 2009; Fritz and Gelatt 2010; NMFS 2010). Throughout the range, there are two groups of trend sites: those that have been consistently monitored since the mid 1970s (called 70s trend sites) and those monitored since 1991 (90s trend sites; NMFS 2010).

The techniques used for these counts have changed over time. Thus, data collected during different periods using different techniques (e.g. on-site counts, oblique photo counts, or vertical high resolution photos) are not directly comparable (Fritz and Stinchcomb 2005; Pitcher et al. 2007; Kaplan et al. 2008; DeMaster 2009; NMFS 2008, 2010).

The estimated ratio of pups to non-pups in Steller sea lion populations can be used to estimate population size. This method was described by Calkins and Pitcher (1981) who estimated that the total population size was 4.5 times the number of pups born. This derivation is based on estimates of sex and age structure, and birth rates, in a stable population for the Gulf of Alaska.

Population trend is calculated by plotting non-pup counts over time. NMFS (2010: page 80) stated that using the currently established and consistently applied survey methodology (in which non-pup counts are completed by vertical high resolution photography every 2 years), there is a greater than 90% chance of detecting a 1% per year change in population abundance over 8 years (over which time, 4 surveys would have been undertaken).

3.5.1 Eastern DPS Overall

The best available information indicates that the overall abundance of Steller sea lions in the eastern DPS has increased for a sustained period of at least three decades. Similarly, the best available information indicates that pup production has increased significantly, especially since the mid-1990s.

Based on the comprehensive eastern DPS range-wide survey conducted in 2002, Pitcher et al. (2007) estimated that about 11,000 pups were produced in the eastern DPS in 2002. Based on these data, they provided a "general" estimate of total abundance for this DPS of about 46,000-58,000, noting this adjustment was subjective and arbitrary due to the adjustment used to account for pups not counted during the survey (Trites and Larkin 1996). Pitcher et al. (2007) estimated that, for the 25-year period between 1977 and 2002, overall abundance of the eastern DPS of Steller sea lion had increased at an average rate of 3.1% per year.

There are new pup and non-pup count data available since Pitcher et al.'s (2007) analyses from most portions of the range. Between 2002 and 2009, NMFS (unpublished) conducted surveys in southeast Alaska, Fisheries and Oceans Canada surveyed British Colombia (Olesiuk 2008), counts of non-pups were made in 2008 by aerial survey in Washington (Jefferies, pers. comm.), and aerial photographic surveys were flown in Oregon (through 2008), and in California (NMFS unpublished data from 2009 and 2010).

When these new data are added to Pitcher et al.'s (2007) time series of surveys, the interval over which we can assess population trend is lengthened, and thus, the confidence that the positive trend is real and sustained is also increased. Based on the new pup count data from southeast Alaska (DeMaster 2009), British Columbia (Olesiuk 2008), Oregon and California (NMFS unpublished data), and multiplying that number (13,889 pups) by either 4.2 or 5.2 (depending on assumptions about the ratios of pups to non-pups in Steller sea lion populations; Trites and Larkin 1996; Pitcher et al. 2007), Allen and Angliss (2011) estimated the population abundance of the eastern DPS to be within the range of 58,334 and 72,223 in 2009.

A geometric Brownian motion model was fitted to the count data collected from Southeast Alaska to California for the 30 yr period 1979-2009 to calculate abundance by region (NMML, 2012). This analysis used the pup counts and the multiplier of 4.5 to estimate the number of animals in each subpopulation (Calkins and Pitcher, 1982). The best available information indicates the eastern DPS has increased from an estimated[1] 18,040 animals in 1979 (90% CI: 14,076-24,761) to an estimated 63,488 animals in 2009 (90% CI: 53,082 - 80,497); thus an estimate of an overall rate of increase for the eastern DPS of 4.3% per

[1] Model estimate for 1979 acknowledges that in that particular year only Southeast AK was surveyed.

year (90% confidence bounds of 1.99% – 7.33%, Figure 3.5.6). Moreover, given the observed data, the probability that the overall growth rate was >3.0% was 0.84 (NMML 2012). Most of the overall increase in population abundance was due to increases in the northern portion of the range in southeast Alaska and British Columbia, but the smaller population in the south (Oregon and California) also increased significantly in abundance (e.g., Fritz et al. 2008; Olesiuk 2008; DeMaster 2009; NMML 2012).

It is important to note that on a worldwide basis, the eastern DPS has become more important to the long-term viability of the species as a whole as it has recovered, while the western DPS has only recently begun to show limited but significant overall population growth (DeMaster 2011). The rookeries producing the most eastern DPS pups are now in Southeast Alaska and British Columbia (Figures 3.1 and 3.2). In 2002, approximately 2,500 pups were counted at the Scott Islands rookery in British Columbia (NMFS 2008); a 2010 survey counted 3,936 pups here (P. Olesiuk, pers. comm. to D. Seagars, NMFS Alaska Region, March 6, 2012). Based on 2009 data (DeMaster 2009), the Forrester Island complex produced 4,036 pups and Hazy Islands 1,976 pups (both in Southeast Alaska). By contrast, in 2009 the largest rookery for the western DPS was at Ugamak Island complex (with 909 pups) in the eastern Aleutian Islands (DeMaster 2009).

3.5.2 Southeast Alaska

Pitcher et al. (2007) noted that sea lion abundance in Southeast Alaska was probably quite low in south-eastern Alaska during the first half of the 20th century (e.g., only one rookery at the Forrester Island complex containing 50-100 animals in the 1920s and 350 in 1945). While survey information is limited up to the early 1970s, it appears the population in the region began to grow rapidly during the 1950s and 1960s (Trites and Larkin 1996). The increase occurred in terms of numbers of pups produced and also in terms of the geographic range over which pups were produced within Southeast Alaska. In the 1970s, the Forrester Complex was the only functional rookery in southeast Alaska (Figure 3.1). Pitcher et al. (2007) noted that the Hazy Islands group was a substantial haulout in the 1950s, pups were first observed on this site in 1979, and pup production grew rapidly at the rookery in the 1980s (638 pups were counted in 1990; NMFS 2008). New rookeries began to be established as abundance increased in the eastern DPS. Between 1979-2005, pup production within Southeastern Alaska increased at a statistically significant rate of 3.1% (Pitcher et al. 2007: Figure 3) and three new rookeries (White Sisters, Graves Rock and Biali Rock) were established in the northern half of southeast Alaska between 1990 and 2005 (Pitcher et al. 2007; NMFS 2008).

Since the review by Pitcher et al. (2007), additional surveys have been undertaken in Southeast Alaska (Fritz et al. 2008; DeMaster 2009, and Fritz and Gelatt 2011). The abundance of non-pups has increased over the long term, almost doubling between 1982 (N=6,898) and 2009 (N=11,798) (Fritz and Gelatt 2011; Table 3.5.2). Non-pup counts were stable between 1991 and 1996, and increased through 2002. The 2008 data utilized in DeMaster (2009) were compromised due to the June survey date, which was considerably earlier than in previous years (NMFS 2010). Counts of non-pups in Southeast Alaska (Table 3.5.2; Figure 3.5.1.A) have been more variable than those in other regions, particularly in recent years, which appear to have depressed estimates of non-pup population growth in this area. Note for example the anomalously high count in 2009. Additional surveys were flown in 2010 to investigate the hypothesis that the high variability in non-pup counts from Southeast Alaska and eastern Gulf of Alaska (part of the western DPS) may be related to survey timing and the movement of sea lions taking advantage of seasonally available prey resources (e.g., salmon, spawning herring). The results, shown in Table 3.5.2 (DeMaster 2009; NMML 2012), tend to support this hypothesis. As a consequence, time series of

non-pup counts in these areas may be less reliable indicators of recent (since 2000) population trends than pup counts.

Pup production increased in Southeast Alaska between 1979 (N=2,219) and 2009 (N=7,443 at the 5 rookeries; total = 7,462) at a statistically significant rate of 3.6% per year, if one assumes that the increase is spread evenly over the years (DeMaster 2009; NMML 2012). DeMaster (2009) summarized that "Between 2001/02 and 2009, rookery pup production increased 50% (from 4969 to 7443) in SE Alaska." Pup production at just four rookeries in Southeast Alaska totaled 3,408 in 2009 (Fritz and Gelatt 2010: Table 5). NMFS (2010) noted the levels of pup production and the density of animals on shore are likely near historical highs at Forrester Complex and Hazy Island, the two oldest and largest Southeast Alaska rookeries in southeast Alaska.

Gelatt et al (2007, in AFSC 2010) studied mitochondrial and microsatellite variants in samples collected from pups on Graves Rock and White Sisters, the two most recently established rookeries in Southeast Alaska. This analysis found that these rookeries were established in part by females born in the western DPS. Based on genetic analyses, in 2002 about half of the pups born on White Sisters and about 70% of those on Graves Rock were from western DPS females (Gelatt et al. 2007). To put the contribution of western DPS sourced pups at these sites into context, NMFS estimates that in 2002 there were about 270 pups born to western DPS females on these two sites, while there were an estimated 9,997 pups born to eastern DPS females throughout the eastern DPS range. Thus, the contribution of pups born to western DPS females on eastern DPS sites was just 3% of the total pup production of the eastern DPS Steller sea lion. This status review is based on the abundance trends and information presented for Steller sea lions found in the eastern DPS regardless of their genetic makeup.

New data indicate that the trend in population growth in new sites across the Southeast Alaskan geographic region as reported by Pitcher et al. (2007) continues. Mathews et al. (2011) estimated trends in abundance of Steller sea lions in the Glacier Bay area through Icy strait to Lituya Bay from the 1970s to 2009. They concluded that sea lions increased very rapidly (8.2%/yr (95%CI = 6.4%–10.0%)) in this region. They documented the transition of a haulout to a rookery (at Graves Rock) and the colonization of several new haulouts with sea lions from both the western and the eastern DPS colonizing the Graves Rock rookery. These authors suggested that the availability of new habitat following deglaciation, immigration, redistribution, decreases in mortality and ecosystem-level changes were likely factors contributing to the exceptional growth in this area. These increases in breeding range provide a measure of protection against localized stressors that may adversely affect a population.

In summary, the Steller sea lion population has increased in southeast Alaska at rates exceeding 3% per year since the 1970s and has expanded its use of terrestrial habitats (Pitcher et al. 2007; NMML 2012). Pup production increased significantly at a rate of 3.6%/y between 1979 and 2009 and four new rookery sites have been established. By 2009, pup production at these four new rookeries totaled 3,407 where 30 years previously only 32 pups were counted, an increase of over 100-fold. At the Forrester Complex, pup production also increased, but by less than 2-fold during this same time period (N=4,036 in 2009); suggesting density dependent factors may be limiting growth here and that this colony is likely to continue to contribute to the expanding colonization at other sites within Southeast Alaska or northern British Columbia.

3.5.3 British Columbia

In British Columbia (BC), the first Steller sea lion counts were conducted at rookeries in 1913 (DFOC 2008). Based on these counts, an estimate of 14,000 Steller sea lions of all ages, including pups, were present on rookeries in 1913-19, a period before any large scale killing occurred (Bigg 1984, 1985; DFOC 2008; DFOC 2011). As a result of culls, estimated abundance fell to approximate 12,000 animals by 1938 and rookeries on the Sea Otter Islands group were eradicated. Harvest and predator control programs resumed in the decade spanning 1956-1966 with large scale killing on rookeries throughout BC reducing abundance from 8,900-9,400 in 1956 (DFOC 2008) to about 4,550 by 1961 (DFOC 2011), and an estimated (DFOC 2008) total in 1970 of about 3,400 animals. DFOC (2011:27) concluded the rookeries in British Columbia had been severely depleted, to about one-quarter of their historic size by the time protection was afforded, first in 1970 by the Fisheries Act in Canada, and then in 1972, by the U.S. Marine Mammal Protection Act. The major factor causing this depletion was intentional killing.

There are now four Steller sea lion rookeries in British Columbia: the Scott Island complex (including Triangle, Beresford-Maggot, and Sartine Islands), Cape St. James, North Danger rocks (Pitcher et al. 2007) and one recently re-established in the Sea Otter group (Olesiuk 2008) (Fig 3.2). Despite being subjected to similar commercial harvests, disturbances, and predator control programs that had eliminated the Sea Otter group rookery, the first three sites were able to persist into the 1970s, each producing less than 350 pups/yr. Pitcher et al. (2007) concluded that the numbers at the Scott Islands had fully recovered by 2002 but that abundance at the other rookeries was still below historic levels. Based on data in Table 3 of Olesiuk (2008:19), between 1971 and 2006, pup production at Triangle Island rookery had increased over 13-fold (from 181 in 1971 to 2,674 in 2006). However, pup production increased by a factor of 1.8 (from 760 to 1,366 pups) at all of the other four rookeries combined. DFOC (2011) reported that pupping has resumed at a breeding site in the Sea Otter group (on Virgin Rocks) in 2006 and a new rookery has been established on Garcin Rocks with pup counts of 104 and 217 in 2008 and 2010, respectively (P. Olesiuk, pers. comm. to T. Gelatt, NMML, Feb. 28, 2012). Olesiuk (2008) summarized that at present these four known breeding areas account for more than 99% of the pup production in British Columbia.

Olesiuk (2008) reported there are 23 year-round haulouts in British Columbia and the number of year-round sites occupied by Steller sea lions has increased from twelve to twenty-three sites over that past three decades. (Pitcher et al. 2007 reported 24 main haulouts are used during the breeding season). These haulouts are typically along the exposed outer coastline. Pitcher et al. (2007) calculated that the number of Steller sea lions counted at these sites increased at a rate of 4% annually from the early 1970s to 2002, when 6,681 non-pups were counted on haulout sites in British Columbia.

Since the species was protected under the Fisheries Act in 1970, province-wide aerial surveys have been conducted every 4-5 years (DFOC 2011). DFOC (2008) reported that adult and juvenile (non-pup) abundance in British Columbia was stable until the early 1980s and then increased at a rate of 5%/year (see Figure 4 of DFOC 2008:6). Based on these data, counts of adult and juvenile sea lions more than tripled between 1971 (N=4,617) and 2006 (N=15,700) (Olesiuk 2008) in British Columbia. Based on the most recent, but as yet unpublished survey (P. Olesiuk, pers. comm. to T. Gelatt, NMML, Feb. 28, 2012) reports 17,996 nonpup Steller sea lions were counted in British Columbia in 2010 (Table 3.5.3) – this is almost four times the number counted in the early 1970s.

In British Columbia, pup production increased from a count of 941 in 1971 to 4,118 in 2006, an increase that would be about 3.9% per year if the increase had been steady (Table 3.5.3). However, DFOC (2008:5) clarified that, like non-pup numbers, pup production was stable until the mid-1980s "but subsequently increased at 7.9% per annum." After applying correction factors to account for pups obscured in photographs and for pups not included in censuses (following Trites and Larkin 1996 and

Pitcher et al. 2007), Olesiuk (2008) estimated total pup production in British Columbia in 2006 to be about 4,800 and that the total abundance could range from 4.0 to 5.8 times the number of pups born. Thus "…at least 20,000 and perhaps as many as 28,000 Steller sea lions currently inhabit coastal waters of B.C."(Olesiuk 2008). Pup production has continued to increase with the most recent pup count of 5,485 in 2010 (Olesiuk, pers. comm. to T. Gelatt, NMML, February 28, 2012).

In summary, pup production in British Columbia has been increasing for at least 29 years. Non-pup abundance of Steller sea lions in Canadian waters has been increasing since about 1982/1983 and the population has expanded their use of terrestrial habitats northward since the 1970s (Pitcher et al. 2007; Olesiuk 2008; NMFS 2008; DFOC 2011; NMML, unpublished, cited in AFSC 2011). With the recent reestablishment of the Sea Otter Group rookery (55 pups counted in 2006), Steller sea lions are now breeding on all documented historic rookeries in Canadian waters (Olesiuk 2008) and the population has shown a strong growth and recovery in British Columbia for 30 years or longer (Table 3.5.3; Figure 3.5.1.b).

3.5.4 Washington

Kenyon and Scheffer (1959) reported 2000-3000 Steller sea lions on Jagged Island in August and September of 1914, 1915 and 1916. These numbers were subsequently reduced - primarily due to intentional killing related to a historical bounty offered by the State of Washington on Steller sea lions.

Pitcher et al. (2007) reported that Steller sea lions, presumably immature animals and non-breeding adults, regularly used four haulouts, of which two were "major" haulouts (with > 50 animals) during the breeding. Between 1989-2002, surveys were conducted almost annually. Pitcher et al. (2007) reported a maximum statewide breeding season count of 847 between 1978-2001, and a count of 651 non-pups at the two major haulouts in 2002. They also reported that the numbers of sea lions counted between 1989 and 2002 on Washington haulouts increased at an average annual rate of 9.2% (r^2=0.38; n=37; P<0.001).

While some pupping has been reported recently along the coast of Washington State (ODFW and WDFW 2010), there are no active rookeries. In the petition to delist the eastern DPS of Steller sea lion submitted by the ODF&W and the WDF&W, the petitioners, citing unpublished WDFW data, reported that sea lion surveys conducted by the WDFW along the Washington coast show "both increasing Steller sea lion numbers at haul out areas as well as increasing number of newborn pups at several locations over recent years." However, these data were not submitted with the petition.

3.5.5 Oregon

Historical data prior to 1968 on Steller sea lion abundance in Oregon are scant (Pitcher et al. 2007). Evidence indicates that the breeding abundance of Steller sea lions in Oregon has increased since 1977. There are two active rookeries, Rogue Reef and Orford Reef, and seven major haulouts occupied in Oregon during the breeding season (Pitcher et al. 2007). At rookeries, the total number of non-pups increased at an average annual rate of increase of 2.5% from 1977 (1186) to 2002 (2442) (Pitcher et al. 2007). Including the numbers of Steller sea lions at haulouts, NMFS (2008, based on data in Brown et al. 2002) reported an annual rate of increase in the total number of non-pup sea lions counted during the breeding season surveys at all of these sites at a significant rate of 3.7%/y between 1977 (1,461) and 2002 (4,169) (Figure 3.5.1.C and Figure 3.5.5).

Since the Pitcher et al. (2007) analysis, the Oregon Department of Fish and Wildlife has conducted Steller sea lion surveys in 2003, 2005, 2006, and 2008. Analysis of these data is ongoing and counts are preliminary for all years except 2003. The final count for 2003 was anomalously high at 5,714 non-pups counted and, in that year, increases in non-pup numbers were seen at multiple locations throughout the state. The count for 2005 was incomplete due to poor weather. Preliminary counts for 2006 and 2008 indicate the non-pup abundance trajectory generally follows the upward trend line depicted in Pitcher et al. (2007) (B. Wright, ODFW, pers. comm.). In the petition to delist the eastern DPS of Steller sea lion submitted by the ODF&W and the WDF&W, the petitioners (ODFW and WDFW 2010:2), citing unpublished ODFW data, report that abundance surveys conducted from Northern California to Washington demonstrate continued population growth at nearly 4% through 2008.

3.5.6 California

Pitcher et al. (2007) summarized that Steller sea lions historically used six rookeries in California: San Miguel Island, Año Nuevo Island, the Farallon Islands, Seal Rocks off of San Francisco, Sugarloaf Island-Cape Mendocino, and Saint George Reef. They noted that additional small rookeries may have existed south of Año Nuevo. San Miguel Island, at the southernmost part of the historic range is no longer used, nor is the Seal Rocks site. Since the 1980s, only a few Steller sea lion pups have been born in recent times on the Farallon Islands (Pitcher et al. (2007).

Historic survey data from California is based on a number of sources and has been collected by a variety of means (Pitcher et al. 2007). This limits our ability to quantitatively assess long-term trends in California. However, it is clear that Steller sea lion numbers and trends in southern California have not followed the same trajectory as the Alaska portion of the population (NMFS 2008) and likely have been influenced by a complex suite of human activity, population growth of sympatric species, and climate fluctuations. An unknown number of Steller sea lions were killed in the Channel Islands by commercial sealers and fishermen in the 1800s and early 1900s (Stewart et al. 1993). Pitcher et al. (2007) reported that the total statewide count of Steller sea lions on the above six rookeries in the "first half of the 20th century" was about 3,900-5,600 animals. Steller sea lion abundance in central California (Año Nuevo and the Farallon Islands) in 2002 was only about 20% of that recorded in the period from the 1920s through the 1960s (Pitcher et al. 2007). The combined 2004 count at the six rookery sites was 1,578 non-pups and 818 pups. Thus, estimates indicate that only about a third as many Steller sea lions were in California in 2004 as in the first half of the century (Pitcher et al. 2007). Pitcher et al. (2007:108) indicated that:

> from 1996 to 2004 there was no discernible statewide trend for non-pups on rookeries.. ; however, pup production increased at an average annual rate of 8%.

Recently, NMML (2012) summarized trends for the three rookeries in California where breeding still occurs (Año Nuevo, Sugarloaf/Cape Mendocino, and St. George Reef). Non-pup counts at the three trend sites in California have been stable between 1990-2009, while pup production increased at 5.3% per year between 1996 (N=546) and 2009 (N=893).

Population trend and distribution in the southernmost portion of the Steller sea lion range differs from the rest of the eastern DPS. Pitcher et al. (2007) reported that counts of Steller sea lions in the Channel Islands peaked at about 2,000 non-pups in the late 1930s, and declined considerably in the 1940s. in a series of papers covering surveys of sea lions from 1927 to 1947 Bonnott states "the breeding range of Steller sea lion is from Santa Rosa Island to Alaska" (Bonnot 1951). This statement is not supported by reported observation of pups on Santa Rosa Island. The only report of pups on Channel Islands rookeries

was a report of 45 live and 5 dead pups on Flea Island (Castle Rock) at San Miguel Island (Bonnot 1928) Bonnot (1948) reported the continued decline of Steller sea lions in the 1940s with 950 animals at San Miguel Island in 1947. The next count was made in June 1958 with 37 animals reported at San Miguel including 3 pups (Bartholomew and Boolootian 1960). In the 1960s, Steller sea lions on the Channel Islands likely faced considerable and growing competition from other pinnipeds, especially California (CA) sea lions. In June of 1964, Odell (1971) estimated there was a minimum of "at least 34,382 CA sea lions, including a count of 4,598 pups." This contrasts with the nearly 50,000 CA sea lion pups counted for the region in 2000 (Lowry and Maravilla-Chavez 2005).

By 1969 there were two territorial adult males, associated females and 13 pups at Northwest Point, San Miguel Island; from 1969 to 1981, Steller sea lion breeding abundance on San Miguel Island declined (DeLong and Melin 2000). The last known birth of a pup on the island is variably reported to have occurred in 1981 (DeLong and Melin 2000; NMFS 2008) or 1982 (Stewart et al. 1993). The last observation of a breeding age animal on the island during the breeding season occurred in 1983 (DeLong and Melin 2008).

Año Nuevo Island and the Farallon Islands were the most important Steller sea lion rookeries in California the 1920s,with 625 and 400 pups counted at each site in 1922 (Bonnot 1929). On Año Nuevo Island numbers remained at high levels until the early 1960s, then declined thru the 1980s (Orr and Poulter 1967, Le Boeuf et al. 1991). From 1990 through 2009 pup production has ranged from 312 to 152 annually with the low counts associated with El Niño events. The most recent, 2009, count was of 214 pups. Although current numbers of pups born are about one-third what was recorded in 1922, pup production is relatively stable. Counts for the Farallon Islands indicate abundance was high from the 1922 to early 1960s and then declined sharply during the 1960s or early 1970s (Hastings and Sydeman 2002). Pup production on the Farallons has been low since at least 1974 and has ranged from 2 to 24 pups from 1990 to 2009 (NMML 2012). The Steller sea lions rookery at Seal Rocks near the entrance to San Francisco Bay was abandoned by breeding animals early in the first decade of the 1900s as a result of shooting by California institutional officials. It remained a seasonal hauling ground through the 1920s (Rowley, 1929; Bonnot, 1929) and was subsequently abandoned.

At the three rookeries in California (Año Nuevo, Sugarloaf/Cape Mendocino, and St. George Reef) pup production increased at 5.3% annually from 1996 through 2009 (NMML 2012). But sea lion abundance during the 2000s in central California (Año Nuevo and the Farallon Islands) has only been about 15-20% of that recorded from the 1920s to 1960s (Pitcher et al. 2007).

The reasons underlying the disappearance of breeding Steller sea lions from the southernmost part of their range (i.e., the extirpation of the San Miguel Island rookery complex) are not entirely known (DeLong and Melin 2000) nor is it entirely clear why this site has not been recolonized when the eastern DPS, overall, has increased for an extended period of time. DeLong and Melin (2000) noted that:

1) The loss of the breeding rookeries at San Miguel Island, the far southern end of the range, occurred when Steller sea lions were declining in abundance (Loughlin et al. 1984) throughout their range;
2) The cause of the decline may have been related to both competition with CA sea lions for breeding habitat as well as shifts in ocean conditions.

The status of the California sea lion population has changed greatly since Steller sea lions were abundant in the southernmost portion of their historic range, including at San Miguel Island. DeLong and Melin

(2000) noted that the California sea lion population had "increased exponentially" since the mid 1960s. Thus, competition for breeding and hauling out space with California sea lions may explain, at least in part, why Steller sea lions have not recolonized San Miguel Island for breeding. The rapid and dramatic increase in abundance of California sea lions in southern California waters also may have resulted in competition for prey as there is some overlap in prey between these two species.

There has been a distinct northward expansion in the range of California sea lions in recent years (Mate 1975; Bigg 1985, Manicalco et al. 2004). This movement appears to be displacing Steller sea lions northward (Mate 1975; Scordino 2006). Furthermore, the decline in Steller sea lions at San Miguel Island occurred during a decadal shift in ocean temperature (Trenberth and Hurrell 1994; McGowan et al. 1998). Thus, in addition to the likely interspecific competition, the range of the eastern DPS of Steller sea lions also may have shifted north in response to warming ocean conditions. It has been hypothesized that one outcome of climate change is likely that the geographic ranges of species may shift toward higher latitudes during warming periods (e.g., Lodge 1993; Lubchenco et al. 1993; Holbrook et al. 1997).

To summarize population trends for California, over about the past 15 years non-pup numbers have been stable and although the overall statewide population is about one-third of the numbers present in the first half of the century, there has been about a 5% growth rate in pup production for Steller sea lions in central and northern California. The rookery sites on San Miguel Island in southern California were abandoned in the early 1980s; that there has been no recolonization is most likely explained by some combination of interspecific competition with California Sea Lions and a shift to warmer ocean conditions. The abundance of Steller sea lions in California has shifted from the central to the northern portion of the state.

4 EVALUATION OF WHETHER RECOVERY CRITERIA HAVE BEEN MET WITH RESPECTIVE EVALUATION OF APPROPRIATE LISTING FACTORS

4.1 Process for evaluating if the biological and listing factor recovery criteria have been met.

Following regulations implementing the ESA (50 CFR §424.10 and 424.11) and recommendations in NMFS finalized guidance on the content of 5-year reviews under the ESA, this section reviews the best available scientific and commercial information to evaluate whether each recovery criterion listed in the 2008 Recovery Plan has, or has not, been met. The evaluation considers the biological (demographic) recovery criteria, the five listing factors included in section 4(a) of the ESA, and the listing factor criteria set forth in the Recovery Plan, and discusses whether the eastern DPS currently meets the definition of a threatened species under that Act.

"The ESA requires that recovery plans, to the maximum extent practicable, incorporate objective, measurable criteria which, when met, would result in a determination in accordance with the provisions of the ESA that the species be removed from the List (50 CFR 17.11 and 17.12). The recovery criteria comprise the core standards upon which the decision to delist a species will be based" (NMFS 2008: VII-3).

NMFS (2008: VII-2) incorporated such objective and measurable criteria for the eastern DPS of Steller sea lion into the Recovery Plan:

> To remove the eastern DPS of Steller sea lion from the List, NMFS must determine that the species' abundance, survival, and distribution, taken together with the threats (i.e., ESA listing factors), no longer render the species "likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." Any new factors identified since listing must also be addressed in this analysis to ensure that the species no longer requires protection under the ESA.
>
> Recovery criteria must include the elimination of threats to the species as well as measures of demographic health. Both sets of criteria serve as checks on one another – one set of criteria requires evidence that the threats to Steller sea lions have been eliminated or controlled and are not likely to recur (listing factor criteria), and the other set of criteria requires evidence that the population status of Steller sea lions has improved in response to the reduction in threats (biological criteria).

The NMFS (2008) Recovery Plan, written with the assistance of a large Recovery Team comprised of federal, state, and academic scientists, fishing industry representatives, Alaska Natives, and the environmental community, undertook a threats assessment for the eastern and the western DPSs of Steller sea lion and an evaluation of the demographic response of the species following management measures to reduce threat. The Recovery Team also commissioned an assessment of the extinction risk of the eastern DPS (included as an appendix to the Recovery Plan).

The Recovery Plan and its components underwent extensive public comment and independent peer review. The threat assessment within the Recovery Plan represents a thorough review of the threats posed by various factors to Steller sea lions and an analysis of demographic data (including survey data up to 2002). The following evaluation of the demographic criteria (4.2), the statutory listing factors, and the Recovery Plan's "delisting factor criteria" (4.3) begins with the findings of the 2008 Recovery Plan and considers those in light of new information that has become available since that document was issued.

4.1.1 Time Frame for Evaluation: The Foreseeable Future

The Endangered Species Act and implementing regulations provide the following definitions of an "endangered species" and a "threatened species" (16 USC 1532(6) & (20); 50 CFR 424.02):

> Endangered species means any species that is in danger of extinction throughout all or a significant portion of its range;
>
> Threatened species means any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Thus, the objective of this status review is to assess if (NMFS 2008: VII-2):

> the species' abundance, survival, and distribution, taken together with the threats (i.e., ESA listing factors), no longer render the species "likely to become an endangered species *within the foreseeable future* throughout all or a significant portion of its range." (Emphasis added.)

"The foreseeability of a species' future status depends upon the foreseeability of both the threats to the species and its response to those threats. When a species is exposed to a variety of threats, each threat may be foreseeable on a different time frame…" (Cameron et al. 2010:55)

The term "foreseeable future" is used here to refer to the timeframe over which identified threats to the species can be reasonably foreseen and assessed. In this review, the term is not interpreted to limit the timeframe under consideration to the length of time into the future for which a species' status can be quantitatively modeled or predicted. The appropriate period of time corresponding to the foreseeable future depends on the particular kinds of threats, the life-history characteristics, and the specific habitat requirements for the species under consideration. A wide range of values has been offered regarding the appropriate time horizon for the foreseeable future when evaluating "threatened" status (e.g., 10-20 years, to 100 years, or various multiples of a species' generation time). It is consistent with the purpose of the ESA that the timeframe for the foreseeable future be adequate to provide for the conservation and recovery of threatened species and the ecosystems upon which they depend. It is explicitly not limited by the period considered in a post-delisting monitoring plan nor is it specifically defined. A threat to a species, and the species' response to that threat are not, in general, equally predictable or foreseeable (Cameron et al. 2010:57). Hence, in some cases, the ability to foresee a potential threat to the eastern DPS is greater than the ability to foresee the species exact response, or the timeframe of such a response, to that threat.

We conclude that the relevant consideration is whether the species' population response (in terms of changes in abundance, distribution, survival or recruitment) is foreseeable, not merely whether the emergence of a threat is foreseeable. For purposes of the following analysis, the foreseeable future extends only so far as we are able to reliably predict the species' response to a particular threat and its population consequences. In the following analysis, the foreseeability of each threat is considered separately as is the foreseeability of the species' response to each threat.

4.1.2 Application of the "significant portion of the range" criterion.

Following above, this analysis also needs to take into account the following:

> To remove the eastern DPS of Steller sea lion from the List, NMFS must determine that the species' abundance, survival, and distribution, taken together with the threats (i.e., ESA listing factors), no longer render the species "likely to become an endangered species within the foreseeable future throughout all or *a significant portion of its range*. (NMFS 2008; emphasis added.)

As of this date, there is no final regulatory guidance defining this concept. However, recently NMFS and FWS jointly published (76FR76987; December 9, 2011) a draft policy intended to ultimately provide interpretation of the phrase ''significant portion of its range'' (SPR) in the ESA definitions of ''endangered species'' and ''threatened species.'' The notice provides a draft interpretation and application of ''significant portion of its range'' that reflects a permissible reading of the law and its legislative history and minimizes undesirable policy outcomes, while fulfilling the conservation purposes of the Act. Specifically, the draft policy includes:

(1) An explanation of the consequences of a species being in danger of extinction or likely to become so in an SPR, but not throughout all of its range;
(2) A definition of the term ''significant'' as it applies to SPR;

(3) An interpretation of the term ‘‘range’’ and explanation of how historical range is considered as it applies to SPR; and
(4) A means of reconciling our draft interpretation of SPR with the inclusion of ‘‘distinct population segment’’ (DPS) in the Act’s definition of ‘‘species.’’

The Services noted it is their intent to ultimately issue a final policy on this subject after consideration of public comments (the comment period is open until March 8, 2012, 77FR6138). During this interim period the agencies have determined they will

> consider the interpretations and principles contained in this draft policy as nonbinding guidance in making individual listing determinations. Thus, as nonbinding guidance, we will apply those interpretations and principles only as the circumstances warrant, and we will independently explain and justify any decision made in this interim period in light of the circumstances of the species under consideration.

Following this guidance, this review conducts an analysis using the draft policy and its definitions, recognizing that it is possible there may be revisions made to the guidance, interpretations, and definitions provided in the Notice. The policy addresses many aspects of implementing ESA activities including listing, consultations, establishment of critical habitat, and recovery planning and implementation. Currently, the draft policy is “listing focused” and while the discussion and definitions provided do provide useful guidance to this Review, it does not directly address the process used in an analysis which might lead to a delisting action.

For purposes of this Review the following pertinent definitions are provided from the draft guidance:

> If a species is found to be endangered or threatened in only a significant portion of its range, the entire species is listed as endangered or threatened, respectively, and the Act’s protections apply across the species’ entire range.
>
> *Significant:* A portion of the range of a species is ‘‘significant’’ if its contribution to the viability of the species is so important that without that portion, the species would be in danger of extinction.
>
> *Range:* The range of a species is considered to be the general geographical area within which that species can be found at the time FWS or NMFS makes any particular status determination. This range includes those areas used throughout all or part of the species’ life cycle, even if they are not used regularly (e.g., seasonal habitats). Lost historical range is relevant to the analysis of the status of the species, but it cannot constitute a significant portion of a species’ range.

The reader is referred to 76FR76987 (December 9, 2011) and 77 FR 6138 (February 7, 2012) for an extensive review and complete details of the draft policy.

4.2 Evaluation of the Demographic - Biological Criterions

The Recovery Plan (NMFS 2008: VII-3) specified that:

> The eastern DPS of Steller sea lion will be considered for removal from the List when the likelihood of its becoming endangered in the foreseeable future has been eliminated by achieving the following biological criteria:

• The population has increased at an average annual growth rate of 3% per year for 30 years.

4.2.1 Recovery Plan Evaluation and Recent Population Status and Trend Data

In 1997, NMFS issued a rule reclassifying the ESA status of Steller sea lions into two distinct population segments: the western DPS listed as endangered and the eastern DPS listed as threatened (62 FR: 24345, May 5, 1997). In doing so, NMFS noted the eastern DPS appeared to be stable but called attention to uncertainty about this population trend. This uncertainty existed because of fluctuations in pup production, declining counts in southern portions of the range, and because too few years had passed for NMFS to have confidence that the population was, in fact, increasing. As a result, the threatened status of the eastern DPS was maintained in the final rule.

In addition to the above biological criteria for growth, the Recovery Plan noted:

> The time period chosen for this criterion reflects three generations such that there would be assurance that survival and reproduction were robust. (NMFS 2008: VII-4).

And:

> For the past 25-30 years, the eastern DPS has been growing steadily at about 3% per year…more than doubled and is now [2006] estimated to be about 46,000 animals. (NMFS 2008:VII-3)

Section 3.5 of this document reviews the best scientific information available concerning population status and trend as presented in, and newly available since, completion of the Recovery Plan (NMFS 2008). To summarize key points made by DeMaster (2009) and NMML(2011; 2012) from that section:

- Pup production in Southeast Alaska:
  Increased from 5,510 in 2005 to 7,442 in 2009;
  Has significantly increased at 5%/yr since the mid-1990s;
  Has significantly Increased at 3.6%/yr since the late 1970s;
  Counts of non-pups at trend sites have increased significantly at 1.4% since 1982.

- In British Columbia:
  Pup production has been increasing at 9%/yr since the mid-1990s,
  Has significantly increased at 3.9% since the early 1970s, and
  Non-pup numbers have increased significantly at 3.5%/yr since the early 1970s.
  Based on the most recent, but as yet unpublished survey (P. Olesiuk, pers. comm. to T. Gelatt, NMML, Feb. 28, 2012) 17,996 nonpup Steller sea lions were counted in British Columbia in 2010 – this is almost four times the number counted in the early 1970s.

- In Washington:
  Abundance remains lower than historical levels; however recent preliminary survey data (WDFW) reports increasing Steller sea lion numbers at haul out areas as well as increasing number of newborn pups at several locations over recent years.

- Results of the 2009 Oregon and California aerial survey indicate:
  Pup production in Oregon has increased at 3%/yr in Oregon
  Pup production in California has been increasing at 5%/yr; with

The number of non-pups reported as stable.

- Stability in the non-pup portion of the overall California population and the lack of recolonization at the southernmost portion of the range (San Miguel Island rookery) is likely a response to a suite of factors including: climate induced northward range shift, competition for space on land (haulouts and rookery sites) and possibly for prey with other more temperately adapted pinniped species that have experienced explosive growth over the past three decades (California sea lions and northern elephant seals). The context of this general lack of performance in the central and southernmost portions of California is discussed further, below.

- The best available information indicates the eastern DPS has increased from an estimated 18,040 animals in 1979 (90% CI: 14,076-24,761) to an estimated 63,488 animals in 2009 (90% CI: 53,082 - 80,497); thus an estimate of an overall rate of increase for the eastern DPS of 4.3% per year (90% confidence bounds of 1.99% – 7.33%). Moreover, given the observed data, the probability that the overall growth rate was >3.0% was 0.84 (NMML 2012).

NMFS selected the biological recovery criteria for the eastern DPS to assure that data were collected over a long enough period of time to allow NMFS to "be assured that survival and reproduction were robust." Now, is years since NMFS's 1997 precautionary decision to continue to list the eastern DPS as threatened, the overall pup and non-pup trend data indicate a robust and long-term recovery of this DPS.

4.2.2 Analyses of Extinction Risk of Eastern DPS Based on a Population Viability Analysis model.

Goodman (2006: Appendix A in NMFS 2008) conducted an analysis of the extinction risk of the eastern DPS of Steller sea lion. At the time of his analysis, Goodman had available two series of data related to population trend: 1) 24 counts, conducted annually except for missing counts in 1978 and 1991, of non-pups from Oregon sites from 1977-2002, and 2) nine counts of pups at southeast Alaska sites between 1979-2002.

Based on analysis of the SE Alaska pup data, Goodman (2006) found that the posterior mean for the growth rate was 3.13%, the posterior standard deviation was 0.413%, and the posterior mode was 3.14%. The 95% posterior confidence interval was from 2.29% to 3.95%. Given these data, the analysis indicated that posterior probabilities of low growth rates were very low: the posterior probability that the growth rate of the eastern DPS is less than 2% was about 0.7% and the probability of growth rate less than 1.5% was about 0.1%.

Since 2002, NMFS have undertaken additional aerial surveys of pups in southeast Alaska, generally on a biennial basis. The most recent pup counts were conducted in 2009 and trends from these data are summarized above (DeMaster 2009; NMML 2012). These data show that the positive growth rates apparent at the time of Goodman's analysis have continued with a very strong upward trend in pup production in this region since 2002.

Based on the analysis of the Oregon non-pup count data, Goodman (2006) found that the posterior mean for the growth rate was 3.64%, the posterior standard deviation was 0.405%, and the posterior mode was 3.68%. The 95% posterior interval was from 2.42% to 4.44%. Goodman's analysis (2006) of the Oregon non-pup count series indicated that posterior probabilities of low growth rates were again very low, in this case much lower than the already low probability estimated from the southeast Alaska pup count

data. Based on the Oregon non-pup count data, Goodman's analysis showed that the posterior probability that the growth rate of the eastern DPS is less than 2% was about 0.01%.

The most recent non-pup count data from Oregon available at the time of Goodman's population viability analysis (PVA) was from 2002. Thus, it is important to determine if the upward trend in non-pup counts in Oregon continued, as this long-term upward trend was important in Goodman's analysis as discussed above, and his related conclusions about the low foreseeable risk of extinction of this population. Oregon Department of Fish and Wildlife (ODFW) biologists have conducted Steller sea lion surveys since 2002: in 2003, 2005, 2006, and 2008. However, the analyses of these data are ongoing and counts are preliminary for all years except 2003. Additional aerial surveys of the California and Oregon coast were conducted by the NOAA Southwest Fisheries Science Center in 2009 and 2011. However, only the 2009 data are available in preliminary form at this time.

The final count for 2003 was unusually high at 5,714 non-pups counted and, in that year, increases in non-pup numbers were seen at multiple locations throughout the state. The count for 2005 was incomplete, due to poor weather. Preliminary results from counts from ODFW for 2006 and 2008 indicate the non-pup abundance trajectory generally follows the upward trend line depicted in Pitcher et al. (2007) (B. Wright, ODFW, pers. comm.). Preliminary count data for 2009 indicate a continued increase in the number of pups for both Oregon (1,418) and California (891) with the number of non-pups stable in both states (NMML 2012).

Based on the aforementioned, the new (since 2002) demographic data collected supports Goodman's (2006) conclusions regarding the low extinction probability of the eastern DPS of Steller sea lions. There are now longer time series for both of the two main data sets that were available to him and these data sets show continued upward trends and provide evidence of continued recovery.

It should also be noted (Goodman 2006 Appendix A in NMFS 2008) that:

> A working hypothesis to account for these observations on the eastern DPS is that:
>
> 1. The population is not sensitive to ongoing regime-frequency environmental variation,
> 2. The depressed, but steady and positive, growth rate north of California is owing to a combination of ecosystem modification and possible incidental take that is stable and sustainable,
> 3. The carrying capacity is not less than 46,000 total individuals, and
> 4. The lack (of) recovery of the California portion of the population is owing to range contraction responding to the warming trend of the past several decades.
>
> If all this is true, and continues to be true, the risk of near-or medium-term extinction for this population is very low. While there is no evidence to the contrary, we do not have conclusive information that this hypothesis complex is true, or that it will continue to hold in the future. Accordingly we could judge this population to be at low risk provided management maintains the current level of protection, keeps human impact at no more than its present level, and monitors to make sure that evidence contrary to the hypothesis complex will be detected.

NMFS believes the Goodman (2006) analysis made reasonable inferences about extinction risk and that those inferences likely continue to remain valid - given current trends as indicated by available updated

biological/demographic data collected over the past eight years. Therefore, NMFS concludes that the extinction risk for the species in the foreseeable future will remain very low.

4.2.3 Is the California Portion of the eastern DPS a "Significant Portion" of the Range?

The Recovery Plan (NMFS 2008) made note of the above described "lack of performance" of the eastern DPS of Steller sea lions in the central and southern California portions of the range:

> There has been some concern over the performance of rookeries and haulouts at the very southern end of the range in California especially in contrast to the growth observed in southeast Alaska. However, no criteria are provided here [in the recovery plan] for sub-regions within the range. It is not unusual for the geographical limit of a species range to perform less than the core regions.
>
> The present size of the California portion of the population, which occupies the southern edge of the species range, is about 20% of that recorded there in the middle of the 20th century, and it is believed that the population may have been larger yet in the 19th century (Appendix). In recent times, consistent California-wide counts began in 1996. During the recent decade of monitoring, pup production in California has trended upward, while non-pup numbers have varied from one census to the next, but with no clear trend.

Based on a review of the population data available at the time it was written the Recovery Plan concluded:

> The question of whether an area constitutes a "significant portion of the range" relates to the biological importance rather than the geographical extent. Although the population trend at the southern limit of the range has not followed the same trajectory as the Alaska portion there are no data available to suggest it is biologically unique (Ono 1993). However, given the limited genetic studies done in the southern part of the range, the potential for uniqueness cannot be ruled out. This demography does not increase the risk of extinction for this species and therefore, it seems appropriate to evaluate the eastern DPS as a whole when establishing recovery criteria.

Recently completed genetic studies have resolved the lingering question of relatedness, establishing that the southern California portion of the population is not a separate "valid DPS" (Bickham 2010a).

Given that new population and demographic data are available since that used in the Recovery Plan and to follow the (draft) guidance provided recently by 76FR76987 (December 9, 2011), the stated concern about population trends in California relative to the population as a whole leads us to specifically evaluate the question: *Is the California portion of the eastern DPS a "significant portion of the range*?"

Particularly relevant sections of the draft guidance include:

> If we were to identify any portions that warrant further consideration, we would then determine their status (i.e., whether in fact the species was endangered or threatened in a significant portion of its range). Depending on the biology of the species, its range, and the threats it faces, it might be more efficient for us to address the "significant" question first, or the status question first. Thus, if we determined that a portion of the range is not "significant," we would not need to determine whether the species was endangered or threatened there; if we determined that

> the species was not endangered or threatened in a portion of its range, we would not need to determine if that portion was "significant."
>
> …to determine if a portion of a species' range is significant, FWS or NMFS would ask whether, *without that portion*, the representation, redundancy, or resiliency of the species—or the four viability characteristics used more commonly by NMFS—would be so impaired that the species would have an increased vulnerability to threats to the point that the overall species would be in danger of extinction (i.e., would be "endangered"). If so, the portion is significant.

Relevant to the southern California end of the range, the guidance states:

> Lost historical range may, however, be an important factor in evaluating the current status of the species. The effect of loss of historical range on the viability of the species can be an important consideration in our status determination, and could prompt us to list a species because the loss of historical range has contributed to its present status as endangered or threatened throughout all or a significant portion of its range. In such a case, we do not list a species because it is "endangered" or "threatened" in its lost historical range, but rather because it is "endangered" or "threatened" throughout all or a significant portion of its current range because that loss of historical range is so substantial that it undermines the viability of the species as it exists today.

To provide a focused analysis of the population data available in California relative to the range in total, the best available data are:

- Steller sea lions historically have used six rookeries in California: from south to north:
  - San Miguel Island
  - Año Nuevo Island
  - Farallon Islands
  - Seal Rocks off San Francisco
  - Sugarloaf Island-Cape Mendocino, and
  - Saint George Reef.

- San Miguel Island was the southernmost rookery (Bonnot, 1928, 1929). Steller sea lions bred there in small numbers; Bonnot (1929) counted 50 pups in 1928; this is currently the minimum number of pups born for the site to be considered a rookery. Abundance of non-pups in the Channel Islands peaked at about 2,000 in the late 1930s. Numbers subsequently declined through the 1940s and the 1950s, probably due to hunting and harassment (Bartholomew and Boolootian, 1960; Bartholomew, 1967). No births have been recorded since 1982, and Steller sea lions are not known to have used San Miguel Island to haul out since 1983. However, up to four sub-adult and adult males were observed hauled on rocks offshore from Northwest Point, San Miguel Island in the fall, 2010 and winter of 2011 (written account from J. Harris, Research Ecologist, NMML/AFSC to T. Gelatt, Alaska Ecosystem Program Lead, NMML/AFSC, 16 February 2012).

- In central California, Año Nuevo remains the only current rookery of the three sites where Steller sea lions historically gave birth. Pup counts at Año Nuevo since 1990 have averaged 225 per year, and have been relatively stable (214 in 2009). Pup counts at the Farallon Islands remained at 10 or less through 2002, but the last two counts, in 2004 and 2009, have been 22 and 24,

respectively, suggesting that this site may reestablish itself as a rookery. Steller sea lions no longer haul out on Seal Rocks, and have not used the site since the 1920s.

- Steller sea lion numbers in California likely reached their nadir in the 1980s, with the steepest decline occurring in the 1950s and 1960s.

- Pup production at the two rookeries in northern California has doubled since the mid-1990s.

- Total pup production in California (includes small number of pups born at the Farallon Islands) increased at 5% per year between 1996 and 2009.

- While non-pup counts in California in the 2000s are only 34% of pre-decline counts from 1927-47, the population is increasing significantly at 3% per year (since 1990).

- With initiation of protections limiting the direct take of Steller sea lions, the eastern DPS rapidly showed signs of gradually recovering throughout most, but not all, of its range. At the time the Recovery Plan was prepared, data from Oregon and southeast Alaska indicated those two portions of the subpopulation area accounted for the bulk of the eastern DPS. In the decade since the data used in the Recovery Plan, we now know that in addition to the significant increase of pups in southeast Alaska and Oregon, there have also been significant increases in pups (3.9%/yr) and non-pups (3.5%/yr) in BC since the early 1970s and increasing numbers of non-pups reported in WA.

- Even with the loss of two rookeries in California (San Miguel and Seal Rocks), eastern DPS Steller sea lion pup production at other rookeries in California has increased over the last 20 years and, overall, the eastern DPS has increased at an average annual growth rate of 4.3% per year for 30 years. Even though these rookeries may be "lost," their loss did not result in either the extinction or even a decline in abundance of Steller sea lions in the rest of California or in the rest of the eastern DPS.

- While the California portion of the eastern DPS likely had its lowest abundance in the 1980s, recovery throughout the rest of the eastern DPS to the north (in OR, BC and southeast AK) was already underway. Recovery in California lagged the rest of the stock by 10-15 years but has recently shown a positive trend. Clearly, this portion of the population is not "so substantial that [its loss or decline] undermines the viability of the species as it exists today" (76FR76987; December 9, 2011).

- Genetic studies (Bickham 2010) conducted at Año Nuevo Island, California show that notwithstanding the small size of the population at this site, it is highly variable and includes only mtDNA haplotypes previously known from the eastern stock and that there is no genetic basis to further subdivide the California portion from the eastern DPS in its entirety.

Therefore, NMFS concludes the California portion of the eastern DPS should *not* be considered "a significant portion of the range."

4.2.4 Summary of Evaluation of Demographic/Biological Criteria

Based on the best available information for non-pup and pup trend data and related population abundance estimates, NMFS concludes that the biological (demographic) criteria components of the recovery criteria as described by the 2008 Recovery Plan have been met. Furthermore, an evaluation and update of the trend data used in the extinction risk analysis indicates that the risk of extinction is very low throughout most of the range of the eastern DPS of Steller sea lions.

4.2.5 What Current Biological Status Tells Us About the Listing Factor Criteria for a Currently Listed Species

Cameron et al. (2010) noted that "Threats to a species' long-term persistence…are manifested demographically as risks to its abundance; productivity; spatial structure and connectivity; and genetic and ecological diversity. These demographic risks thus provide the most direct indices or proxies of extinction risk." The current demographic status and recent demographic history for the eastern DPS indicate that, under the current protections, which prominently include the ESA, as well as protections under the MMPA that are parallel in certain important respects, any threats have been controlled to the extent that recovery has been able to proceed for an extended period of time.

However, future threats, except those deriving from demographic characteristics, are not manifest in current demographic status. Therefore the next section reviews the Listing Factor Criteria specified in the Recovery Plan, determines if these have been met, and considers if new information indicates if there are residual threats, or threats that are likely to emerge in the foreseeable future, especially within the context of delisting.

4.3 Evaluation of the ESA Listing Factors and Associated Criteria

The second delisting criterion identified in the 2008 Recovery Plan for the eastern DPS of Steller sea lion is:

> 2. The ESA listing factor criteria are met (NMFS 2008: xiv).

This section identifies and reviews the five listing factors described in section 4(a) of the ESA, evaluates present and possible future threats to the eastern DPS within the context of each factor, makes a determination if the population meets the criteria for delisting under each factor, and reaches a conclusion as to whether or not the eastern DPS meets the definition of a threatened species under the ESA.

This evaluation considers threats to this DPS projected over the foreseeable future throughout all or a significant portion of its range. "Threats" are human or natural events/actions that are responsible for, contributing to, or could contribute to the key limiting factors. Future threats are activities that are likely to happen but are not currently occurring, or that may currently exist and are likely to continue and/or result in a mounting risk to the species. The focus of this evaluation is on those threats which may be reasonably thought to be of sufficient magnitude that they could render the species "likely to become in danger of extinction throughout all or a significant portion of its range."

4.3.1 Recovery Plan Summaries of Threats to the Eastern DPS

Based on the long-term positive population growth of the eastern DPS, no threats to recovery were identified in the Recovery Plan. However the Recovery Team recognized that certain factors are affecting or have the potential to affect the dynamics of the population (NMFS 2008).

The Recovery Plan evaluated threat factors that may impact the eastern DPS such as: predation; harvests; killing and other human impacts; entanglement in debris; parasitism and disease; global climate change; reduced prey biomass and quality; and disturbance (NMFS 2008). The Recovery team concluded that there are not threats identified that are potentially limiting the population's recovery. The Recovery Plan also assessed the cumulative aspect of threats to the eastern DPS and concluded that given that Steller sea lion numbers are increasing in the range of the eastern DPS, any individual or combined effects currently occurring in the region are apparently not significant enough to prevent the population's growth in those areas (NMFS 2008:VI-8).

> Similar to the western DPS, there is also uncertainty as to the level of current and historical impact of various threats and whether there have been changes in the magnitude of those threats to the eastern DPS. It is thought the prior threats, primarily in the form of directed human take (shooting), have been adequately addressed. As the breeding range and center of the eastern DPS has moved northward, prior threats associated with the previous southern range extent such as competition with other increasing pinniped populations and activities associated with a high human population density may have been largely alleviated (NMFS 2008:vi-8).

Below, we evaluate new information with respect to threats to the eastern DPS and with specific attention to the ESA 4(a)(1) "listing" (or delisting) factors. The Recovery Plan (NMFS 2008) addresses each of the 4(a)(1) factors in relatively brief form and draws an overall conclusion that these factors are not impinging on the recovery of the population.

4.3.2 *Factor A: The Present or Threatened Destruction, Modification, or Curtailment of a Species' Habitat or Range*

4.3.2.1 Summary of Recovery Plan Discussion

The Recovery Plan (NMFS 2008) emphasized that the main historical threat to the species was direct mortality, and that even after the passage of the ESA and MMPA intentional killing continued as "…a generally accepted behavior until recent years. " While the Recovery Plan's discussion of factors potentially influencing the eastern population (pp VI-1 – VI-8) did not specifically mention habitat destruction, it did address the potential for competition between eastern DPS Steller sea lions and commercial fishing for their prey. The Recovery Plan found no evidence of nutritional stress in the eastern DPS but did note there are commercial fisheries that target key Steller sea lion prey, including Pacific cod, walleye pollock, Pacific hake, salmon, and herring. It was recognized that in some regions fishery management measures appear to have reduced this potential competition (e.g., no trawl zones and gear restrictions on various fisheries in southeast Alaska) and in others the very broad distribution of prey and seasonal fisheries that differs from that of sea lions may minimize competition as well (e.g., hake along the west U.S. coast).

The Recovery Plan (NMFS 2008) concluded:

Prey resources currently appear to be adequate to support recovery. Future fisheries management and other marine resource management should specifically consider sea lion needs in their planning.

4.3.2.2 Global Climate Warming and Ocean Acidification

The Recovery Plan (NMFS 2008) did not identify a significant threat to the eastern DPS of Steller sea lions from climate change, nor was ocean acidification identified as a threat in that Recovery Plan. However, NMFS did identify concerns regarding global climate change and its potential to adversely affect the southern part of the range (i.e., California). The Recovery Plan thus recommended that future monitoring target this southern portion of the range.

Since the writing of the Recovery Plan, additional information has increased concern about these related threats. Connecting global warming and ocean acidification to increased levels of carbon dioxide in the atmosphere, recent scientific literature has expressed a growing concern over the potential impacts of these phenomena (McCarty 2001; Fabry et al. 2008; NRC 2010; IPCC 2007b; ACIA 2004; NMFS 2010). Findings particularly relevant to Steller sea lions included shifts in the range and abundance of algae, plankton, and fish in high-latitude oceans and changes in the migrations of fish in rivers (IPCC 2007b: 8-9).

Lubchenco et al. (1993) predicted a northward shift in the geographic range of species in response to climate change, and there is now evidence to support that hypothesis (summarized in NRC 2010: 17). The general northward shift in distribution within the breeding range and the decline of eastern DPS Steller sea lions in the southernmost part of the range may reflect just such a response to climate change.

In general, Steller sea lions are likely to be less sensitive to this threat than other marine organisms, as they are opportunistic and mobile predators. However, the flexibility of the eastern DPS in responding to climate change is limited by the terrestrial nature of some of their important habitat, such as rookery sites. Historically, rookery sites have been located near areas of high productivity and seasonally available food resources. The foraging efficiency of nursing females may be affected by factors that change the timing, distribution, and abundance of key prey in the proximity of rookeries. While new rookery sites have been established in the northern part of the range of the eastern DPS, the number of sites with suitable characteristics that are also protected from human disturbance may be limited within the range of this DPS. Past patterns of resilience to environmental variability may not, therefore, clearly predict the future ability of the eastern DPS to respond to environmental change.

Global climate warming and ocean acidification pose a threat to the Steller sea lion population from potential food web alteration, direct physiological impacts on prey species, or more generally, to changes in the composition, temporal and spatial distribution and abundance of Steller sea lion prey assemblages. If the underlying food webs are affected by ocean acidification and climate change, this population segment of Steller sea lions would also likely be affected.

It has become increasingly clear that global climate warming and related acidification of the oceans poses a serious threat to marine ecosystems in general. However, consideration of this issue is complicated by the rapidly evolving understanding of this complex threat, the uncertainty about how Steller sea lions might respond, and the inability to apply this knowledge under the “foreseeable future” standard to predict a response by the eastern DPS with any reliability. Clearly, the issue is not specific to Steller sea

lions or their habitat. Steller sea lions may be no more sensitive to such modification than many other marine mammal species.

Based on the available information, it is likely that global warming and ocean acidification may affect eastern North Pacific subarctic ecosystems before the end of this century; however the magnitude, timing, and mechanism of the changes, and how they may affect the eastern DPS of Steller sea lion is, at this point, impossible to predict. Given the increasing population trends of the eastern DPS of Steller sea lion, the robust reproduction over a large range, and the relatively large population size, the available information suggests that global warming and ocean acidification are not impeding this population's overall viability and are not likely to cause it to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

4.3.2.3 Indirect Fisheries Interactions

There are numerous federal, state, and/or provincial commercial fisheries, recreational fisheries and subsistence fisheries within the range of the eastern DPS of Steller sea lion. We discuss effects of direct taking in these fisheries under Factor B, below. Mechanisms by which fisheries can have indirect effects on Steller sea lions have been reviewed extensively in the scientific literature; a particularly thorough review of relationships between commercial fisheries and possible nutritional stress in the western DPS of Steller sea lions is found in NMFS (2010). Fisheries present within the range of the eastern DPS of Steller sea lion could cause such effects, which include:

- Acting as a competitor for prey
- Causing changes in the local or regional absolute and relative (with respect to other species) abundance of some fish species with the potential for:
    - impacts on ecosystem structure, function, and the resiliency of populations within some food webs
    - changes to the age and size structure of fish populations
    - reductions in Steller sea lion foraging success
- Causing changes to fish distributions with resultant effects on Steller sea lion sea foraging efficiency
- Causing changes in the average size and age of fish in a population, thereby potentially affecting Steller sea lion foraging efficiency and affecting the dynamics of the fish populations
- Causing damage to habitat (e.g., due to bottom trawling) of Steller sea lion prey
- Disturbance of rookeries or haulouts resulting in abandonment of the site on a short-term and/or long-term basis

Within Southeast Alaska, commercial fisheries that harvest Steller sea lion prey include fisheries for salmon, herring, demersal shelf rockfish, ling cod, and black and blue rockfish. Commercial fishermen harvest salmon in Southeast Alaska using purse seines and gillnets, set gillnets in Yakutat, and hand and power troll gear in both areas. Herring are harvested in sac roe, spawn-on-kelp, bait pound, and winter bait fisheries. In the breeding range of the eastern DPS, ADF&G also manages state groundfish fisheries (Region 1) from U.S.-Canada border to the Yakutat area. These groundfish fisheries include directed fisheries for Pacific cod (longline), demersal shelf rockfish (DSR; longline), sablefish (longline/pot), lingcod (dinglebar/jig), and black rockfish (primarily mechanical jig) (http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyareasoutheast.groundfish). All of the directed groundfish fisheries other than the directed sablefish fisheries (which are limited entry and

limited to Chatham and Clarence strait) are open access. Alaska State fisheries, which are not managed under parallel (to the federal management of the species under the FMP) management include lingcod, blue, and black rockfish, sablefish and Pacific cod.

Since the early 1990s, fishing with trawls has been prohibited in all portions of the EEZ off Southeast Alaska. This prohibition effectively precludes a pollock fishery in the range of the eastern DPS, though a small trawl pollock fishery continues off British Columbia. Other fisheries in SE Alaska for Pacific cod, salmon, and herring commonly use fixed gear (e.g., hook and line, pots) or mobile, non-trawl gear such as seines and trolling. These gear types reduce the rate at which fish can be caught (for most species and gears), and may reduce the likelihood of fishery-induced local depletions of commercially important prey species as well as effects on the habitat and populations of other Steller sea lion prey species.

There is no indication that fisheries in Southeast Alaska are currently competing with Steller sea lions to the point where the harvest level constitutes a threat to the survival and recovery of the eastern DPS in this region. Rather, concurrent with the ongoing prosecution of these fisheries, there has been a recent increase in abundance and pup production of Steller sea lions in Southeast Alaska and a lack of direct physical data showing effects related to nutritional stress (e.g. emaciated pups or yearlings) or indirect evidence (e.g. reduced or declining survival, declines in pup to non-pup ratios).

DFOC (2011) reported that commercial fisheries that target important Steller sea lion summer prey species in British Columbia include fisheries for herring, hake, sardines, salmon, and groundfish. They summarize that it is not known whether limitations in a given prey species may limit population growth (DFOC 2011). However, they concluded that due to the "unrestrained, exponential growth" of the Steller sea lion population in British Columbia, in the presence of ongoing fisheries, there is no evidence that fisheries have had a negative effect on this population. They expressed some concern for potential population-level effects in the future due to the increase in population abundance of the sea lions.

Limited entry commercial fisheries for salmon and herring exist in Washington State. Salmon fisheries include troll, gillnet (Willapa Bay-Columbia River, Grays Harbor-Columbia River, and Puget Sound gillnet fisheries), reefnet, and purse seine. Licenses are also given for commercial charter and angler fish operations. Herring licenses are also limited by moratorium and include the following fisheries within Puget Sound: Dip bag net, drag seine, gillnet, lampara, and purse seine. There is a limited entry fishery for Pacific whiting within Puget Sound.

Groundfish fisheries along the US west coast in the US EEZ of the northeast Pacific Ocean are managed by NMFS under the regime established in the Pacific Coast Groundfish Fishery Plan (PFMC 2008) via the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). Fish stocks managed under this regime are given in Table 3-1 of PFMC 2008:14-15). The Recovery Plan (NMFS 2008) recognized the importance of a key prey species for Steller sea lions along the Pacific west coast managed under this Plan: the Pacific hake (whiting). The Plan noted that even during the 1987-2001 period of declining hake catch and a reduction in the stock (age 3+ fish) there was not a concurrent change in Steller sea lion population trajectory in the region. Furthermore:

> Fishery regulations and the typical distribution of the fishery north of 44 N. lat. may minimize the potential for competition between foraging Steller sea lions and the hake fishery during the summer months when the Steller sea lion population is concentrated on rookeries in southern Oregon and northern California. (NMFS 2008)

Given the sustained significant increases in non-pup abundance and increases in pup production of Steller sea lions in Southeast Alaska, British Columbia, Oregon, increasing abundance in Washington, current and anticipated continued fisheries management procedures and regulatory mechanisms, there is no indication that fisheries are directly or indirectly competing with eastern DPS Steller sea lions to the point where the level of fisheries related competition constitutes a threat to the survival or recovery of the eastern DPS of Steller sea lions. We conclude indirect effects of these fisheries are not likely to cause the eastern DPS to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range.

4.3.2.4 Coastal Development and Disturbance

Coastal development, in the form of tourism, settlement, industry, shipping, and human population growth may lead to more noise, human presence and other outcomes that increase disturbance of Steller sea lions on terrestrial sites or in the water, or to their prey. Disturbance to sea lions can emanate from the air, water, or from land and from many sources including, but not limited to: tourism (e.g., tour boats, private boats, hikers); scientific research on Steller sea lions or other marine mammals, birds, habitat, fish, archaeological sites; defense-related activities; aeronautical research and commercial activities; oil and gas activities; air transportation; recreational and commercial fishing; development; hunting; and recreation. The type of disturbance that may affect Steller sea lions is likely to vary throughout the range of this DPS because of the expansive geographic distribution and varied density of human settlements and sea lions, as well as the seasonality of both sea lion and human activities.

The Recovery Plan (NMFS 2008) acknowledged the vulnerability of Steller sea lions to human disturbance, noting a (then) recently conducted study (Kucey 2005) which concluded that Steller sea lions on a haulout in Southeast Alaska were sensitive to various types of disturbance and responded with temporary movements from the area. The Plan also reviewed actions taken by the agency under the Section 7 consultation process, including analysis of the effects of a two large-scale development projects proposed in or near Steller sea lion habitat in Southeast Alaska – the Kensington Gold Mine Project (a formal biological opinion) and the Juneau Access road (an informal consult). NMFS noted potential existed for some disturbance to sea lions on coastal haulouts and in regions frequented by foraging animals. NMFS (2005b) concluded the Kensington project was not likely to jeopardize the existence of Steller sea lions or to destroy or adversely modify their critical habitat. The Plan concluded its review of disturbance by noting "the continued pressure of developments in otherwise wilderness areas may ultimately result in the abandonment of haulouts" (NMFS 2008: VI-8). Review of the Access road project concluded the action was not likely to adversely affect Steller sea lions or their critical habitat.

Currently designated critical habitat provides a measure of protection from disturbance associated with federal agency actions that may destroy or adversely modify such habitat. In the final rule designating critical habitat (58 FR 45269) NMFS identified "the extent and type of human activities and disturbance in the region" as one of the factors that "influence the suitability of a particular area" as a rookery or haulout.

NMFS acknowledges the potential threat of human disturbance, which may diminish the value of terrestrial habitat as sites for resting, reproduction, nursing and platforms from which to feed, but notes the existence of protections against such disturbance under a variety of State and federal statutes designed to protect marine mammals and other wildlife. These protections, though directed against disturbance, will limit the extent to which human disturbance can diminish the value of terrestrial habitat of the eastern DPS. The prohibitions and penalties related to "take" in the MMPA (16USC 1371; Section

101(a)) provide a strong measure of protection for both animals and any occupied habitat. In particular, the MMPA, through its prohibition on harassment (defined at 16USC1362: Section 3(18)(A)) provides clear direction and assurance that human activity and development must take into account essential habitat needs (e.g., freedom from human disturbance that might cause "disruption of behavioral patterns…(such as) migration, breathing, nursing, breeding, feeding or sheltering") that are required to maintain healthy populations of sea lions and other marine mammals.

The petition submitted by the States of Washington and Oregon noted:

> A very large portion of the land-based habitat of Steller sea lion in the eastern population is included in some form of protection or federal law (e.g., federal or state managed reserves and refuges). In Oregon and Washington nearly all coastal rocks and islands used (by) Steller sea lions fall under the jurisdiction of the US Fish and Wildlife Service refuge program. Along the north Washington coast where most haulout areas in the state occur falls within the NOAA Olympic Coast Marine Sanctuary.

Other aspects of the MMPA provide procedures for implementing specific protections to marine mammals by limiting the degree and circumstances of potential take due to human activities. For example, Congress amended the MMPA in 1981, 1986, and 1994 to provide various mechanisms for the authorization of "incidental take" (including harassment) of marine mammals due to various activities, provided that NMFS finds that the takings would be of small numbers and would have no more than a "negligible impact" on affected marine mammal species, and not having an "unmitigable adverse impact" on subsistence harvests of these species (see http://www.nmfs.noaa.gov/pr/permits/incidental.htm). NMFS regulations define a "negligible impact" as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the species or stock through effects on annual rates of recruitment or survival" (50 CFR 216.103). Before authorizing the incidental take of marine mammals, NMFS must provide an opportunity for public comment on its proposal to do so and must specify the: 1) Permissible methods and the specified geographical region in which take will be authorized; 2) Means of effecting the least practicable adverse impact on the species or stock and its habitat and on the availability of the species or stock for "subsistence" uses; and, 3) Requirements for monitoring and reporting, including requirements for the independent peer-review of proposed monitoring plans where the proposed activity may affect the availability of a species or stock for taking for subsistence uses. Such authorizations may be obtained for taking endangered or threatened marine mammals, again provided NMFS finds the taking (lethal, injurious, or harassment) will be small in number and will have no more than a negligible impact on the affected stock(s) of marine mammals. These limits will continue to apply to NMFS's ability to authorize incidental take of eastern DPS Steller sea lions even if the species is removed from the list of threatened species.

Under section 404 of the Clean Water Act, permits must be issued by the US Army Corps of Engineers for development projects affecting wetlands or other aquatic resources. NMFS routinely reviews these permit applications and provides comments and recommendations designed to reduce or otherwise mitigate any potential adverse impacts to trust resources such as wetlands, fish, and marine mammals and their habitats.

NMFS concludes there is no current evidence indicating human disturbance of Steller sea lions on or near coastal habitats has affected the ongoing recovery of the eastern DPS of Steller sea lions. In the

event the eastern DPS is delisted from the ESA, there are significant regulatory mechanisms available (e.g., MMPA prohibitions) that provide a means to eliminate or otherwise minimize possible adverse effects of disturbance associated with human activity. These mechanisms will ensure that Steller sea lions on coastal haulouts and rookeries will be protected against human disturbance and that their adjacent foraging habitat is not altered, such that the eastern DPS of Steller sea lion is not likely to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range.

4.3.2.5 Toxic Substances

NMFS (2008a) summarized that "Existing studies on Steller sea lions have shown relatively low levels of … heavy metals, and these levels are not believed to have caused high mortality or reproductive failure (Lee et al. 1996) and are not considered impediments to Steller sea lion recovery." However, surveys have shown that captive and western stock Steller sea lions have relatively high levels of organic pollutants in their systems, specifically organochlorines (OC), such as PCBs and DDTs (Meyers and Atkinson 2012; Wang et al 2011). It is noteworthy that PCB levels at the highest concentrations recorded for samples taken from Steller sea lions in southeast Alaska (NMFS unpublished; in NMFS 2008) have been shown to reduce juvenile survival in sea otters (AMAP 2002). However, most studies to date on Steller sea lions have involved animals from the western DPS or in Russian and Asian waters and as NMFS (2008a: VI-8) noted:

> contaminant risks are largely unknown in Steller sea lions and are little understood in pinnipeds in general (Barron *et al.* 2003). Definitive studies that have causally linked contaminant exposures and adverse effects in pinnipeds have been limited to laboratory studies with PCBs and Hg in dietary studies with captive seals. Field studies with pinnipeds have been confounded with other factors and cannot be unambiguously linked to contaminant caused impacts. The sensitivity of pinnipeds to contaminants relative to the sensitivity of other species is largely unknown. Thus, adverse effect levels of contaminants in Steller sea lions must be inferred from studies in other species (Barron *et al.* 2003). As a result, the primary data gap is an understanding of what levels of contaminants affect sea lion health, and subsequently also affect vital rates, especially reproduction.

Much remains to be learned about the levels of a suite of contaminants and the physiological mechanisms and reproductive consequences of such substances in eastern DPS Steller sea lions (Atkinson et al. 2008; Meyers et al. 2008; Barron et al. 2003). Studies conducted in southern and central California (Sydeman and Jarman 1988; DeLong et al. 1973; Ylitalo et al. 2005 and others see Heintz and Barron 2001 for review), have recognized there is potential for adverse consequences of high levels of contaminants in pinnipeds in this highly industrialized region. In the past two decades there has been an emerging understanding that contaminants, especially those that bioaccumulate and are persistent can pose a risk to reproductive success (Ross et al. 1995; Beckmen et al. 2003; Hammond et al. 2005). What has been found for metals and OCs in Steller sea lions has led some to speculate that "the decline of Steller sea lions in central California may be due to the combined effects of ocean warming affecting prey availability, competitions for prey with California sea lions, contaminants and disease" (Sydeman and Allen 1999).

However, virtually all reviews conducted to date have called attention to a lack of widespread, statistically meaningful sampling and well executed companion laboratory studies – all necessary to fully

understand the meaning and effects of those contaminant concentrations found in the population. Thus, while it is important to continue to study and monitor the levels of key contaminants such as heavy metals and organochlorines "…there is no evidence to support that any of these [compounds] either individually or collectively are current threats to recovery" (NMFS 2008: vi-8). Therefore NMFS does not find evidence that contaminants currently pose a threat likely to cause the eastern DPS of Steller sea lions to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range.

4.3.2.6. Oil and Gas Development

NMFS (2008a) did not identify potential pollution or disturbance from oil and gas development as a threat to the eastern DPS of Steller sea lions.

Oil and gas leasing, exploration and development has occurred directly in the historic or current range of the eastern DPS in waters off California. New leasing is not currently occurring or planned offshore of California, but there are multiple active leases and platforms on which drilling is occurring and oil is produced in that state. Maps of these leases are available at: http://www.boemre.gov/omm/pacific/lease/lease.htm. They include multiple platforms at the southernmost extent of the range, shoreward of the Channel Islands, off Point Arguello, and off Huntington and Seal Beaches. In July of 2010, BOEMRE Pacific region indicated that there are currently 241,023 acres in active leases and 43 of the 49 active leases are producing in California.

While there is a history of oil and gas exploration on the Olympic Peninsula and adjacent offshore areas of Washington State, there has not been recent activity. There are no active offshore leases in Washington, Oregon, or Southeast Alaska.

In 1995, NMFS conducted a section 7 consultation with the MMS on the proposed oil and gas Lease Sale Number 158 near Yakutat and concluded that the lease sale and exploration activities for the proposed Yakutat sale were not likely to jeopardize the continued existence of any listed or proposed species, nor were the activities likely to destroy or adversely modify critical habitats (NMFS 1995). Within the range of the western DPS, NMFS has requested deferral areas to protect Steller sea lion critical habitat through processes provided by the National Environmental Policy Act (NEPA) and the ESA.

Based on MMS' (now BOEM) Notice of Intent to Prepare and Scope an EIS (75 FR 16828), BOEM is currently evaluating a proposed OCS Oil and Gas Program for 2012–2017 that would offer all or portions of eight OCS planning areas for oil and gas leasing. In Alaska, these include: Beaufort Sea, Chukchi Sea, and Cook Inlet. While some eastern DPS Steller sea lions venture into the Cook Inlet region, no future oil and gas sales are planned within the breeding range of the eastern DPS.

In 2007, British Columbia issued a new BC Energy Plan that re-affirmed its commitment to offshore oil and gas exploration and development, requested that Canada lift the federal moratorium and stated that the provincial moratorium will be lifted at that time (British Columbia Ministry of energy and Mines and responsible for Housing 2011: http://www.em.gov.bc.ca/OG/offshoreoilandgas/OffshoreOilandGasinBC/Pages/AChronologyofActivity.aspx). Since that time, Canada and British Columbia have taken steps to undertake research and to outline policy (e.g., in 2008, the release of seismic survey mitigation policy) related to initiating exploration and development of offshore oil and gas. However, at this time any future expansion in the region remains uncertain and unknown.

Since 1977, more than 18,000 tankers have been loaded at Valdez for transport to refineries in Washington State, California and Hawaii (http://alaska.conocophillips.com/EN/about/publications/Documents/ArcticEnergy.pdf). Those tankers travelling between AK and the lower states use offshore routes, while those servicing the refinery at Cherry Point, WA, travel through the Strait of Juan de Fuca. In recent years there has been an increase in tankering of oil out of the Kinder-Morgan TransMountain pipeline that terminates in Burrard Inlet (http://www.kindermorgan.com/business/canada/transmountain.cfm). A new project, Enbridge's proposed Northern Gateway pipeline, would terminate in Kitimat and result in a significant increase in tanker traffic in inshore waters on the central-northern British Columbia coast (see http://www.northerngateway.ca/). An Environmental Assessment is currently underway, and Steller sea lion haulout and rookeries have been identified as vulnerable habitats. Oil transportation can pose a risk to the eastern DPS of Steller sea lions throughout its range, principally due to accidental discharge of oil and other hydrocarbons.

NMFS recognizes that exploration and development of oil and gas reserves, and transportation of product within the eastern DPS Steller sea lion range has the potential to adversely affect portions of this DPS in the event of large spills or accidents. However, despite a history of active transportation operations within the breeding range of the eastern DPS, no such events have occurred to date – and recovery of the population has not been affected by such. Given this history, continued or anticipated oil and gas related operations are not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.2.7 Conclusion for Factor A: *The Present or Threatened Destruction, Modification, or Curtailment of a Species' Habitat or Range*

Based on information and analysis in the Recovery Plan (NMFS 2008) as updated here, we find:

- At this point in time, the available information suggests that global warming and ocean acidification are not impeding this population's overall viability and are not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

- There is no indication that fisheries are indirectly competing with eastern DPS Steller sea lions to the point where the level of fisheries related competition is likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

- NMFS finds no current evidence indicating that human disturbance of Steller sea lions on or near coastal habitats is likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future. In the event the eastern DPS is delisted from the ESA, there are significant regulatory mechanisms available under the MMPA and other laws that provide a means to eliminate or otherwise minimize possible adverse effects of human activity.

- While it is important to continue to study and monitor the levels of key contaminants such as heavy metals and organochlorines in the eastern DPS of Steller sea lions "there is no evidence to

support that any of these [compounds] either individually or collectively are current threats to recovery" (NMFS 2008) now or within the foreseeable future.

- NMFS finds no evidence that existing operations of oil and gas related activities are likely to cause the eastern DPS of Steller sea lion to become in danger of extinction within the foreseeable future and there are no future oil and gas lease sales proposed within the breeding range of the eastern DPS.

Therefore, NMFS concludes that the eastern DPS of Steller sea lion is not likely in danger of extinction throughout all or a significant portion of its range, nor likely to become so in the foreseeable future due to the present or threatened destruction, modification, or curtailment of its habitat or range.

In the event the eastern DPS is delisted, the following continued monitoring activities are recommended to be included within a Post Delisting Monitoring Plan (see Section 5.2) to provide periodic checks on possible effects of Habitat related issues:

- Monitor and assess possible indirect effects of fishery removals via periodic health assessments, indices of body condition, survival of pups and juveniles, and pup/non-pup ratios.

- Conduct periodic contaminant sampling.

4.3.3 *Factor B: Overutilization for Commercial, Recreational, or Educational Purposes*

The Recovery Plan (NMFS 2008) stated that "Human-caused mortality of Steller sea lions includes subsistence harvest, incidental takes in fisheries, illegal shooting, entanglement in marine debris, and take during scientific research. In general, the MMPA provides adequate protection for sea lions from the eastern population. None of these factors now appear to be preventing recovery, although it would be appropriate to reduce the magnitude of these when possible."

4.3.3.1 Subsistence Harvests of Steller Sea Lions

Steller sea lions from the eastern DPS are hunted by indigenous people for subsistence and traditional handicraft uses in both southeast Alaska and adjacent areas of Alaska to the north, and in British Columbia (e.g., Zavadil et al. 2005; 2006; Wolfe et al. 2009). While levels of subsistence harvest have increased in recent years in Southeast Alaska compared to those from 1992-1998, the time period reported in the Recovery Plan for the eastern DPS, reported levels are still very low, given the estimated population size and the related Potential Biological Removal level (PBR). New data available since the Recovery Plan continues to indicate that the subsistence hunting does not pose a threat to this population and that it is not likely to pose a threat in the foreseeable future (Table 4.3.3.1). NMFS should continue to monitor this take and should, as recommended in the Recovery Plan (NMFS 2008) take steps to identify, evaluate, and reduce, levels of uncertainty in the estimates of subsistence harvest.

DFOC (2011) reported that aboriginal people in British Columbia traditionally hunted Steller sea lions for food and ceremonial garb. At present, indigenous people can hunt Steller sea lions without a license in B.C. but they are encouraged by the national government to have a Communal License (DFOC 2011). At present, DFOC (2011:28) summarized that as there are not commercial licenses for this activity and

"…there is a very limited subsistence harvest….the level of concern associated with harvests is…negligible."

NMFS concludes that the current level of subsistence harvest does not pose a threat likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.3.2 Direct Fisheries Interactions

4.3.3.2.1 Recovery Plan discussion

A. Intentional Take in Commercial Fisheries

The Recovery Plan (NMFS 2008) did not identify intentional take in commercial fisheries as a threat to the viability of eastern DPS Steller sea lions. Prior to 1990, the MMPA allowed fishermen to lethally deter sea lions from interfering with commercial fishing operations.

However, NMFS (2008) noted:

> The provision allowing lethal deterrence was eliminated in 1990 when sea lions were listed as threatened under the ESA. Increased public scrutiny and the threat of fishery closures curbed illegal killings, and the current level of illegal shooting is believed to be minimal (Angliss and Outlaw 2002).

B. Incidental Take In Commercial Fisheries

The Recovery Plan (NMFS 2008) did not identify incidental take in commercial fisheries as a threat to the viability of eastern DPS Steller sea lions.

The Recovery Plan (NMFS 2008) outlines the protections put in place by the MMPA to reduce and manage incidental take of marine mammals in commercial fisheries:

> The MMPA authorized the incidental take (serious injury and death) of marine mammals in the course of commercial fishing operations while striving to reduce that mortality to an insignificant level. The MMPA was amended in 1988 to better monitor the cumulative effects of fishery-specific incidental takes. As a result, each U.S. fishery is designated as being in one of three categories based on its frequency of marine mammal interaction; this "List of Fisheries" is reviewed annually.

4.3.3.2.2 Current sources and levels of take in commercial fisheries.

The MMPA prohibits intentional take of Steller sea lions and other marine mammals by commercial fishermen. The MMPA does include limited exceptions that allow for the incidental take of marine mammals and for intentional non-lethal take of marine mammals that interfere with gear or catch in limited circumstances. A more detailed discussion of the protections and exemptions under the MMPA can be found in section 4.3.5.2, below.

Section 118 of the MMPA requires NMFS to annually evaluate the potential for interaction between commercial fisheries and marine mammals (16 U.S.C. 1387(c)(1)). Observer programs and "self-reported" data are reviewed annually to estimate the number of marine mammals incidentally caught in commercial fisheries. Annual Stock Assessment Reports (SARs) prepared for each species include a summary of human-related serious injury and mortality data (e.g., Allen and Angliss 2010; 2011). The summary includes data from observer and stranding network reports (e.g., animals hooked and entangled in fishing net debris).

NMFS publishes an annual List of Fisheries (LOF) that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals associated with each specific fishery. If total incidental take of a marine mammal stock from all commercial fisheries is greater than 10% of that stock's PBR, all fisheries that take from that stock are evaluated individually, as follows:

List of Fisheries Categories	***Annual mortality & serious injury as a proportion of PBR***	***Incidental mortality descriptive term***
Category I	≥ 50 % of PBR	"frequent"
Category II	≥ 1% & ≤ 50%	"occasional"
Category III	≤ 1%	"remote"

Category III fisheries are considered to have met the "zero mortality rate goal" (ZMRG), a primary goal of the MMPA. If total incidental take of a marine mammal stock from all commercial fisheries is less than or equal to 10% of that stock's PBR, then all commercial fisheries are considered to be in Category III for that stock, thereby meeting ZMRG.

In 2010 NMFS determined "the annual M/SI [morality/serious injury] incidental to commercial fisheries (25.6 animals), with a US EEZ total annual M/SI of 40.7 animals, will have a negligible impact for purposes of issuing a permit under section 101(a)(5)(E) of the MMPA because total human-caused mortality is less than 10% of the stock's PBR" (see NMFS 2010b; 75FR68767, November 9, 2010). NMFS evaluated all state and federal fisheries as well as other sources of human related mortality to make the "negligible impact determination" (as defined by NMFS), and ZMRG. On December 29, 2010 (75FR81972) NMFS issued a permit to authorize the incidental, but not intentional taking of six marine mammal stocks (including from the eastern DPS of Steller sea lions) listed under the ESA by participants in several groundfish fisheries in the Bering Sea and the Gulf of Alaska.

The five fisheries managed by the State of Alaska in which incidental take of eastern DPS Steller sea lions have been documented at relatively low levels include: 1) Alaska Southeast salmon drift gillnet, 2) Alaska Yakutat salmon set gillnet, 3) Alaska salmon troll, 4) Alaska Gulf of Alaska sablefish longline, and 5) Alaska commercial passenger fishing vessel (charter boat). Each of these fisheries is included in the annual NMFS LOF as required by MMPA Section 118 (*see*, e.g., 76 FR 73912, November 29, 2011).

In none of the five fisheries with documented interactions with eastern DPS Steller sea lions has the take resulted in ≥ 1% PBR of this DPS. No State of Alaska fisheries are classified as Category I on the NMFS List of Fisheries. Two state-managed fisheries, the Southeast Alaska salmon drift gillnet, and the Yakutat

salmon set gillnet, are classified as Category II fisheries. However, that categorization is not based on takes of eastern DPS Steller sea lions. The Southeast Salmon Drift Gillnet Fishery is classified as Category II due to reported interactions with Central North Pacific humpback whales. The Alaska Yakutat Salmon Set Gillnet Fishery is classified as Category II due to interactions with harbor porpoise. If not for the interactions with harbor porpoise and humpback whales, the minimal past interactions of these fisheries with eastern DPS Steller sea lions would qualify them for classification as Category III fisheries (i.e., less than 1% annual mortality or serious injury as a proportion of PBR). Table 4.3.3.2 illustrates the bases for assignment and categories assigned by NMFS for each of the Alaska State fisheries on the most recent List (November 29, 2011).

In the Alaska Yakutat salmon set gillnet fishery, a Steller sea lion was observed entangled in a net, but was able to self-release without serious injury or mortality. Four Alaska state-managed fisheries have been observed to cause serious injury or mortality to eastern DPS Steller sea lions (Alaska Southeast salmon drift gillnet, Alaska Gulf of Alaska sablefish longline, Alaska commercial passenger fishing vessel, and Alaska salmon troll). Uncertainty exists regarding the level of take, including serious injury and mortality in the Alaska salmon troll fishery, because troll gear found on eastern DPS Steller sea lions is indistinguishable between commercial and recreational fisheries (e.g., flashers).

A sixth fishery that could potentially interact with eastern DPS Steller sea lions is the Alaska longline set line (including sablefish, rockfish, lingcod, and miscellaneous finfish), although that fishery has not had any documented interactions with marine mammals. It is still considered a fishery that could potentially directly interact with eastern DPS Steller sea lions because a similar fishery, the Alaska halibut longline/setline (state and federal waters), has taken western DPS Steller sea lions.

Data collected since 1990 in U.S. fisheries outside of Alaska reported eastern DPS Steller sea lion mortalities in the CA/OR thresher shark and swordfish drift gillnet, WA/OR/CA groundfish trawl (Cat III), and northern WA marine set gillnet. The eastern DPS Steller sea lion was removed from the list of marine mammals that the CA/OR thresher shark and swordfish drift gillnet fishery interacts with in 2007, because none had been reported taken by that fishery since before 1997.

It is important to note that not all fisheries known to have taken eastern DPS Steller sea lions are monitored each year in the U.S. Additionally, only limited observer data exist on mortalities of marine mammals incidental to commercial fisheries in Canada (i.e., those similar to U.S. fisheries known to take Steller sea lions). As a result, the number of Steller sea lions taken in Canadian waters is poorly understood.

The issue of fisheries related entanglements of Steller sea lions has received wide attention in recent news reports and on the internet (e.g., http://vimeo.com/29863322). Such entanglement includes bands and gear around the necks and flashers and hooks in the mouth of Steller sea lions. Based on the incidence of observed entanglements and estimates of abundance, Raum-Suryan et al. (2009) estimated that there were between 54-67 visibly entangled Steller sea lions in Southeast Alaska at any one point in time during the summer, 2002. It was not possible to identify if the source of these materials was from commercial and recreational salmon fishing because both fisheries use the same kinds of gear. The incidence of Steller sea lion entanglement in Oregon also has been investigated recently (Raum-Suryan, unpublished report). While those results are still preliminary, it was found that entanglement in fishing gear and marine debris occurs in that region, possibly at a greater incidence than for Southeast Alaska and northern British Columbia. Raum-Suryan et al. (2009) concluded that entanglement rates of Steller sea lions are likely underestimated because the likelihood of observing an entangled animal is poor,

entangled animals may die at sea, there may be no external evidence of entanglement, or the external evidence may be lost over time. The relationship between these entanglement events and any eventual mortality cannot be determined with precision. Even though entanglement rates may actually be higher than what is currently used as the best available estimates of serious injury and mortality associated with entanglement (Allen and Angliss 2011), the population has nonetheless experienced a sustained increase since the 1970s.

The following information is summarized from the most recent (draft) Stock Assessment Report for 2011 (Allen and Angliss 2011): During the 3-year period from 2007-2009, a total of 20 Steller sea lion mortalities occurred in fisheries operating south of latitude 49, however, they could not be assigned to a particular fishery. Fourteen eastern DPS Steller sea lion mortalities were reported in 2007, 8 in 2008, and zero in 2009, resulting in an average annual take of 6.67 animals. Additional fishery-related entanglements were reported in the stranding database, with a total of 9 cases (1 in 2007, 7 in 2008, and 1 in 2009) of serious injury and mortality attributed to entanglement, averaging 1.8 annually between 2005 and 2009.

The best available data indicates a minimum estimated mortality rate incidental to commercial and recreational fisheries (both U.S. and Canada) of 33.5 Steller sea lions per year, based on fisheries observer data (7.47), opportunistic observations (24.2), and stranding data (1.8). Thus this take is just 1.4% of the PBR calculated for the eastern DPS of Steller sea lions at 2,378 animals. The reader is referred to the most recent (draft) SAR (Allen and Angliss 2011; at http://www.nmfs.noaa.gov/pr/sars/draft.htm) for additional details of incidental catch estimated for various fisheries and areas within the range of the eastern DPS.

In summary, the best available information supports a conclusion that relatively small numbers of eastern DPS Steller sea lions are taken incidental to commercial fishing. There is no information to suggest that the numbers of eastern DPS Steller sea lions taken incidental to commercial fishing will increase appreciably in the foreseeable future. NMFS will continue to monitor their take in selected fisheries and will, as recommended in the Recovery Plan (NMFS 2008), take steps to work cooperatively with the States to implement observer programs and other means to identify, evaluate, and reduce, levels of uncertainty in the estimates, and the occurrence of incidental taking by commercial fishing. The estimated level of incidental take in commercial fishing is not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.3.3 Intentional Killing

NMFS (2008) notes that prior to 1970, control programs in Canada killed thousands of Steller sea lions and caused a significant decline in the region. Readers are referred to DFOC (2008; see Figure 2 of DFOC 2008:4) for a review and estimates of historic intentional culls in Canada. DFOC (2011:27) noted:

> For most of the 20th century, the main factor limiting Steller Sea Lions along the west coast of North America was predator control...The only portion of the Eastern population range that escaped large culls was southeast Alaska, where there are no records of the species breeding or being abundant in the early 1900s.

DFOC (2011) reported that while commercial harvest and culls have not been authorized by management provisions in British Columbia since 1970, sea lions were killed in recent years to protect fish in herring

impoundments and fish farms under licenses that allowed for limited harvest of "nuisance animals." Allen and Angliss (2011, citing Olesiuk 2004) reported preliminary data indicated that from 1999 to 2003, a mean of 45.8 Steller sea lions per year were killed in British Columbia as part of this program. However, due to the designation of Steller sea lions as a Species of Special Concern in 2003, killing of this species under such predator control nuisance animal licenses has been prohibited since 2004 (DFOC 2011). However, the status of Steller sea lions in Canada is currently being reviewed and if they are delisted under SARA, predator kills at fish farms could resume.

Bounty payments were offered in both Washington and in Oregon (e.g., Scheffer 1928 as summarized in Stewart et al. 1993). In Washington Steller sea lion abundance declined from several thousand in the early 1900s to less than a hundred by the late 1940s (DFOC 2011). High levels of human-caused mortality, related, at least in part, to bounty payments (Pearson and Verts 1970), resulted in a substantial reduction of the numbers of sea lions in both Washington and Oregon (DFOC 2011), including the Columbia River (Northwest Power and Conservation Council 2004). Rowley (1929) reported that "harassment and killing by bounty hunters and fisherman" reduced the numbers of sea lions in California and "apparently eliminated several breeding sites." Rowley (1929) also describes killing by "officers of the California Commission" in 1901 and 1902 (that likely decimated the breeding rookery at Seal Rocks, San Francisco).

When sea lions were listed as threatened under the ESA, the allowance for "lethal deterrence" was eliminated. A public information campaign to educate people not to shoot sea lions followed the listing. NMFS (2008a:75) noted that "Increased public scrutiny and the threat of fishery closures curbed illegal killings."

There are cases of documented illegal kills in British Columbia (DFOC 2011, citing DFOC unpublished data). DFOC (2011) also states that mortality outside of the limits of permits issued for subsistence or predator control may occur. DFOC (2011:26) characterized the extent of illegal killing of pinnipeds in British Columbia as "poorly understood", with an unknown impact at the level of Steller sea lion populations, and with a moderate potential of mitigation.

New information indicates that the level of shooting in the Pacific Northwest has increased in recent years. In 2009, NMFS NWR records indicate that at least nine Steller sea lions (eight of which were adult female) were shot. All but one of these shootings occurred in Oregon, while the other occurred in Washington. While one of these animals was found alive, it later died. Thus, all are confirmed mortalities due to shooting. In 2010, there were 7 confirmed lethal shootings of Steller sea lions, which were found stranded in Washington State (4) and Oregon (3) (K. Wilkinson, NMFS NWR unpublished data). Based on the available information, it seems likely the level of illegal killing may be underestimated due to the vast and remote nature of much of the range of this DPS and the specific circumstances that need to occur before a shot or seriously injured animal is definitively categorized as an "illegal take."

Allen and Angliss (2011) reported that between 2001 and 2005 there were three reported non-fishery related serious injuries or mortalities to Steller sea lions in Washington and Oregon for an estimated "other" interaction rate of 0.6 animals per year.

At present, there are no commercial harvests or predator control programs in which Steller sea lions can be legally killed in the United States or in Canada, there is a general moratorium on take of all marine mammals under the MMPA, and take of Steller sea lions is also prohibited under provisions of the ESA.

(2011:26) concluded it is "unlikely" that illegal killing in British Columbia currently affects the viability of the population; the impact of such taking in both Canada and the United States is "negligible." While it is likely the illegal take of Steller sea lions is underestimated, NMFS concludes the current estimated level of illegal take is not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.3.4 Scientific Research, Entanglement, and Other Human Related Mortality

Scientific research occurs within the range of the eastern DPS of Steller sea lions. This research is aimed at providing information needed for the conservation of this species. The potential effects of such research were evaluated by NMFS (2009) in the biological opinion related to permitting and funding of Steller sea lion and northern fur seal research. It was discussed more briefly in the biological opinion on the Groundfish Fisheries in the Aleutian Islands, Bering Sea, and Gulf of Alaska groundfish fisheries (NMFS 2010).

NMFS limits research-related mortality to those levels permitted in 2007: up to 15% of the Potential Biological Removal (PBR) level for each stock. Between 2003 and 2007, there were nine incidental mortalities resulting from research on the eastern stock of Steller sea lions, which results in an annual average of 1.8 mortalities per year from this stock (Allen and Angliss 2010).

Entanglement of Steller sea lions in packing bands, discarded fishing gear, rope, hooks and flashers may be reported through the Stranding Network, field studies or by opportunistic sightings. Such entanglement can lead to serious injury and mortality. Entanglements around the neck can be especially deadly if animals are entangled that are still growing (or gaining more massive necks with maturity, as do male sea lions). The Recovery Plan (NMFS 2008) did not identify entanglement as a threat to the eastern DPS. While noting that entanglement in a variety of debris occurs, including packing bands, loops of line, and fishing gear, and may cause mortality, NMFS (2008a:199) noted that "the extent is unknown and may range from a fraction of a percentage to several percent a year."

Information that has become available since the publication of the Recovery Plan has further documented entanglement events and the potential consequences of entanglement to Steller sea lions, especially in the northern part of the range of the eastern DPS. Raum-Suryan et al. (2009) surveyed many haulouts and rookeries throughout southeast Alaska and northern British Columbia between 2000-2007. They observed that more juveniles were entangled or hooked (J hooks and flashers) than any other age class and estimated that the overall observed entanglement rate was 0.26%.

Other human related activities may infrequently result in mortality to Steller sea lions. For example, in 2008, two Steller sea lions died when the doors of research traps closed unintentionally at Bonneville Dam (K. Wilkinson, unpublished NMFS NWR data).

Based on stranding data (Allen and Angliss 2011), the total human-related serious injury and mortality of eastern Steller sea lions for the 2005-2009 period is 25 (11 ingested hooks, 9 entanglements, 3 gunshots, and 2 vessel collisions), giving an average annual serious injury and mortality of 5.0 animals/yr from "other human related sources."

The levels of mortality from research directed activity, entanglement, and "other human related sources" are very small relative to population size and productivity and are not likely to cause the eastern DPS of

Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.3.5 Conclusion for Factor B

Based on information and analysis in the Recovery Plan (NMFS 2008), which has been updated and supplemented here, this review finds:

- Current and expected future levels of subsistence hunting in both Alaska and British Columbia are very low to negligible, not expected to increase appreciably in the foreseeable future, and thus, are not anticipated to pose a threat to this population.

- Only small numbers of eastern DPS Steller sea lions have been and are anticipated to be taken incidental to commercial fishing; the anticipated level of taking is not likely to pose a threat to this population.

- There are no commercial harvests or predator control programs in which Steller sea lions can be legally killed in the United States or in Canada. While it is likely that illegal take (e.g., shootings) of Steller sea lions is underestimated, NMFS concludes the estimated level of this illegal take is not likely to pose a threat to this population.

- Current and anticipated levels of mortality from research directed activity, entanglement, and "other human related sources" are very small relative to population size and productivity.

Therefore, NMFS concludes that commercial, recreational, or educational activities are not likely to result in "overutilization," nor are the combined effects of these threats likely to cause the eastern DPS of Steller sea lion to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

4.3.4 *Factor C: Diseases, Parasites, and Predation*

The Recovery Plan (NMFS 2008) noted that although Steller sea lions are taken by killer whales throughout their range there is no indication that killer whale predation is outside of normal background levels expected in this population at this abundance level. The Plan concluded that predation was not limiting recovery. Diseases are known to occur within this population but appear to be limited to those endemic to the population and are unlikely to have population level impacts. Therefore no criteria were proposed to reduce disease and predation (NMFS2008:VII-5).

4.3.4.1 Disease

New information indicates that the threat of a novel, possibly highly pathogenic infectious disease is higher now than was expected at the time the Recovery Plan (NMFS 2008) was completed.

Phocine distemper virus (PDV), a virus that has caused large scale epidemics with associated mortality in phocids of the North Atlantic, is now present in the North Pacific. Goldstein et al. (2009b) documented the presence of PDV in wild-caught and salvaged sea otters in areas of Prince William Sound, Kachemak Bay, areas of the Kodiak Archipelago, and the Aleutian Islands. Some of these areas, particularly Prince

William Sound, are within the range in which Steller sea lions from the eastern DPS are known to feed and to use haulouts also used by the western DPS (e.g., see DeMaster 2009; NMML 2012). Viral nucleic acid in nasal swabs from free-ranging, live-captured otters confirms viral shedding. Therefore, otters are capable of transmitting PDV to conspecifics and other species (Goldstein et al. 2009b); therefore Steller sea lions from both DPSs are now potentially exposed to this virus.

Conditions may be arising which could enhance Steller sea lion exposure to novel diseases. The marine environment of the eastern North Pacific, the environment in which the Steller sea lion lives, may change in the future due to global warming and related changing ocean conditions. Shifts in the ranges of some species associated pathogens may co-occur or follow such changing environmental conditions over the foreseeable future. Based on the best available information (e.g., Lafferty and Gerber 2002; Goldstein et al. 2009 a), these changes are likely to increase the potential for the introduction of new pathogens.

According to the primary investigator on the relevant studies, the recent identification of PDV in northern sea otters in Alaska created a need to evaluate the current exposure and infection status of other marine mammal species whose ranges overlap. Archived samples from other species collected since 2001 (both nasal swabs from live captured animals and tissues from dead carcasses) were tested by PCR to detect the presence of viral nucleic acid, primarily from animals in the Aleutians and Prince William Sound. Samples tested positive across several locations and sampling years indicating that PDV is also circulating in other marine mammals, in addition to sea otters, in Alaska (T. Goldstein, unpublished data). The goal of current research is to determine if this viral infection is present in Steller sea lions within their range and to attempt to determine the role this viral infection may be playing in the health of these animals (T. Goldstein, pers. comm.).

In 2009 and 2010, over the course of the summer, an abnormally high number of Steller sea lions were discovered dead in Southeast Alaska. A total of 69 stranded Steller sea lions were detected in Southeast Alaska, 55 of which were dead (24 in 2009 and 31 in 2010). Samples were collected for histopathology from a portion of these animals; however, preliminary results did not show any indication that these individuals were exposed to PDV (K. Burek Huntington, pers. comm.).

In a review of information about the potential ability of infectious diseases to affect the overall status and trend of a population, which is the central issue here, Gulland and Hall (2005) noted:

> Little is known about the ecological significance of disease in marine mammal populations because work to date has focused mostly on individual health. Limited data from terrestrial populations indicate that the effect that a living disease may have on a wild population is influenced by… nutrition and…body condition, levels of genetic variation within the population (e.g., Siddle et al. 2007, 2010), and climate (Hudson et al. 2002). Detailed studies sufficient to make these determinations are rare in marine mammal populations.

NMFS recognizes the need to continue to test and monitor for the presence of novel and potentially threatening disease agents such as PDV (see 4.3.7.3 and 5.2, below). However, at the current time there appears to be no evidence the population is being adversely affected by disease agents. NMFS concludes disease is not likely to cause the eastern DPS of Steller sea lion to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

4.3.4.2 Parasitism

NMFS (2010) identified parasites as one of the main factors that "…have affected Steller sea lions throughout their existence." Parasitism was not identified as a threat to recovery in the revised Recovery Plan (NMFS 2008). Available information indicates that Steller sea lions may carry many different kinds and species of parasites including acarian mites in the nasopharynx and lungs; an anopluran skin louse; intestinal cestodes; trematodes in the intestine and bile duct; nematodes in the stomach, intestine, and lungs; and acanthocephalans in the intestine (Dailey and Hill 1970, Dailey and Brownell 1972, Fay and Furman 1982, Shults 1986, Gerber et al. 1993, Haebler and Moeller, 1993).

Hookworm infections have been detected in healthy-looking pinnipeds (e.g., California sea lion pups; Spraker et al. 2007); however, they have also been associated with a high level of mortality. Gross and histological findings suggest that a synergism of bacteria and hookworms is involved in pup mortality. As crowding continues to increase on eastern DPS Steller sea lion rookeries, hookworm infection may become a larger factor in mortality of Steller sea lion pups. Preliminary data (Rea et al. 2010) indicates there are higher stress protein (haptoglobin) levels in eastern DPS animals (than in western DPS animals), where a high prevalence of hookworm parasites has been found, and where animals are crowded. Adequate research has not been conducted to assess the relative magnitude, importance and synergistic effects of parasitism, disease, and crowding in Steller sea lion populations. The potential for these factors to cause population-level effects as density on rookeries and haulouts increases remains uncertain.

At this time available data indicate that the eastern DPS of Steller sea lions is naturally exposed to a large number of infectious agents including parasites. Based on a review of the best available information, there is no information indicating that disease or parasitism is likely to cause the eastern DPS Steller sea lion to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

4.3.4.3 Predation by Orcas and Sharks

NMFS (2008) noted:

> Although Steller sea lions are taken by killer whales throughout their range there is no indication that killer whale predation is outside of normal or background levels expected in this population at this abundance level. The final evaluation is that predation is not limiting recovery.

NMFS (2010) identified predation as one of the factors that have affected Steller sea lions throughout their existence. Steller sea lions are preyed upon by transient killer whales (*Orcinus orca*) (Matkin et al. 1997; 2007; Zerbini et al. 2007, Heise et al. 2003) great white sharks (*Carcharodon carcharias*) (Klimley et al. 2001) and Pacific sleeper sharks (*Somniosus pacificus*) (Sigler et al. 2006). Predation by killer whales is likely a major cause of natural mortality for eastern DPS sea lions (Dahlheim and White 2010). Densities of transient killer whales are higher along the west coast of North America than in western Alaska (Durban et al. 2010) and ecosystem models (Guenette et al. 2006) indicate that killer whales probably account for a high proportion of natural mortality of coastal pinnipeds even though pinniped populations are large and robust. The current status and trend of the transient killer whale population along western Canada has been described as stable (Baird 2001) or uncertain (Williams and Thomas 2007). Based on bioenergetic models (Williams et al. 2004) transient killer whales have the potential to be an important threat, but that effect of predation tends to be dispensatory, such that small, depressed prey populations may be more susceptible than large, robust prey populations. Thus, it is expected that killer whales would be more of a threat when the eastern DPS of Steller sea lions is at a low population level (Horning and Mellish 2012).

Given the continued population increase of the eastern DPS Steller sea lion even as it has experienced current levels of natural mortality associated with killer whale and shark predation, NMFS concludes predation is not likely to cause the eastern DPS Steller sea lion to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

4.3.4.4 Conclusions for Factor C.

Based on information and analysis in the Recovery Plan (NMFS 2008), which has been updated and supplemented here, this review finds:

New information has become available documenting the appearance of PDV within the range of the eastern DPS of Steller sea lion, but to date Steller sea lions do not show signs of this disease. Through established programs such as Marine Mammal Stranding Networks and ongoing collaborative research, routine sampling procedures to monitor the occurrence of this disease have been established and will continue. Appropriate responses (e.g., Unusual Mortality Event response) to critical events (e.g., an epizootic) will be implemented as the need arises. While it is not possible to predict with any certainty even if, or when, this potential threat could affect survival, distribution or abundance, NMFS concludes this factor is unlikely to cause the eastern DPS to become in danger of extinction throughout all or a significant portion of its range within the foreseeable future.

NMFS concludes disease, parasitism, or predation do not appear to be threats likely to cause the eastern DPS of Steller sea lions to become extinct or are likely to do so for the foreseeable future.

4.3.5 *Factor D: The Inadequacy of Existing Regulatory Mechanisms*

4.3.5.1 Existing Regulatory Mechanisms

NMFS (2008a) addressed the issue of the inadequacy of existing regulatory mechanisms related to the eastern DPS in two places in the Recovery Plan. In the first section, NMFS (2008a: II-2) highlighted the apparent effectiveness of the MMPA and the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) in reducing illegal shooting and incidental take in fishing gear:

> The primary conservation effort for the eastern DPS has been the prohibition of shooting. Historically, shooting destroyed many animals and extirpated rookeries and haulouts in the mid-1900s. In the western DPS, incidental take in fishing gear and the shooting of sea lions by fisherman and others were factors in the decline during the 1970s and 1980s. However, by the early 1990s, laws implemented under the Marine Mammal Protection Act (MMPA), ESA, and the Magnuson-Stevens Fishery Conservation and Management Act reduced the level of intentional take to a negligible amount.

The Recovery Plan's second consideration of regulatory adequacy (Ibid: VII-5) primarily focused on the potential threat of human disturbance to Steller sea lions in remote areas:

> Little is known about the potential impacts from changes to the physical environment, disturbance due to vessel traffic, or tourism related activities. Because of lack of information, it is not possible to quantify these threats. However, the potential threat from increased human disturbance highlights the need to keep regulatory mechanisms such as the MMPA in place to protect sea lions.

These summary statements continue to be supported by the best available information (e.g., Allen and Angliss 2011).

Currently, the conservation of the eastern DPS of Steller sea lion is governed by national laws and related regulations and policies in both the United States and in Canada. In the United States, the species is protected under both the ESA and the MMPA, which provide some overlapping protections, particularly in terms of the prohibitions against take included in both statutes. State laws offer additional protections. These are discussed briefly below; the reader is referred to each of these laws and regulations and the related citations for the specific details.

In the United States, there are two primary federal laws that largely govern Steller sea lion management: the ESA and the MMPA. In addition, protections have been afforded to Steller sea lion habitat within the breeding range of the western DPS of the Steller sea lion under regulations adopted under the MSFCMA. At issue is whether regulatory mechanisms would be adequate to conserve this population (i.e., ensure the eastern DPS will continue to survive and grow for the foreseeable future) if the protections of the ESA were removed. Clearly there are a myriad of regulations that may provide varying levels of protections; the following review addresses only a few of the laws key to the conservation of the eastern DPS Steller sea lion. In particular, protections afforded under the MMPA are examined as this would be the primary federal law governing the conservation of this DPS, should it be delisted.

The adequacy of existing regulatory mechanisms must be evaluated in light of the potential threats to the species that have been identified (i.e., if the DPS is removed from the ESA, will other existing regulatory mechanisms be adequate to protect the species from known threats?). If a potential threat presents little or no danger of extinction within the foreseeable future, then regulatory mechanisms that provide minimal protection against such threat, or even a complete absence of such regulatory mechanisms, may be adequate. Accordingly, this section will evaluate the adequacy of existing regulatory mechanisms in light of the potential threats that we have identified throughout this document.

4.3.5.2 Protections Afforded Under the MMPA and the ESA

Previous sections of this review (e.g., 4.3.2.4, above) have noted how the moratorium on taking and other mechanisms in the MMPA provide protection to marine mammals, including the eastern DPS of the Steller sea lion, specific to a wide variety of human activities and development activities. Below we review the moratorium on taking and other relevant provisions of the MMPA, and provide additional discussion of how protections may change in the event the stock is delisted under the ESA as well as how aspects of the MMPA will either continue, or may be further developed through regulation, to provide protection to eastern DPS Steller sea lions in the event the stock is delisted from the ESA.

Eastern DPS Steller sea lions are protected in U.S. waters and on the high seas by the MMPA (16 U.S.C. 1361 et seq.). The MMPA was enacted in response to growing concerns that certain species and populations of marine mammals were in danger of extinction depletion or extinction as a result of human activities. The MMPA set forth a national policy to prevent marine mammal species or population stocks from diminishing to the point where they are no longer a significant functioning element of the ecosystems. In section 2 of the MMPA, Congress included the following findings:

> (2) [marine mammal] species and population stocks should not be permitted to diminish beyond the point at which they cease to be a significant functioning element in the ecosystem of which they are a part, and, consistent with this major objective, they

> should not be permitted to diminish below their optimum sustainable population. Further measures should be immediately taken to replenish any species or population stock which has already diminished below that population. In particular, efforts should be made to protect essential habitats, including rookeries, mating grounds, and areas of similar significance for each species of marine mammal from the adverse effects of man's actions;
> ***
> (6) marine mammals have proven themselves to be resources of great international significance, esthetic and recreational as well as economic, and it is the sense of the Congress that they should be protected and encouraged to develop to the greatest extent feasible commensurate with sound policies of resource management and that the primary objective of their management should be to maintain the health and stability of the marine ecosystem.

Under the MMPA, NMFS has jurisdiction over Steller sea lions. With respect to eastern DPS Steller sea lions, NMFS is responsible conducting scientific research, issuing permits, promulgating regulations, and conducting enforcement as necessary to carry out the purposes of the MMPA. Thus, the federal agency that is responsible for this species would not change if the species is removed from the list of threatened species. Oversight is provided by the Marine Mammal Commission and the Committee of Scientific Advisors on Marine Mammals. This oversight would also stay in place if this species is delisted.

Protection Against Take Under the MMPA:

The MMPA includes a general moratorium on the taking and importing of marine mammals. The moratorium is subject to a number of exceptions, including take for subsistence use by Alaska Natives, for scientific purposes, and for purpose of public display. The MMPA provides for the Services to authorize unintentional incidental take coincident with conducting lawful activities. The MMPA defines "take" as "to harass, hunt, capture, or kill, or to attempt to harass, hunt, capture, or kill any marine mammal." The MMPA defines "harassment" to include "any act of pursuit, torment, or annoyance which … has the potential to injure a marine mammal or marine mammal stock in the wild" (Level A harassment), or "has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering" (Level B harassment).

As described in Cameron et al. (2010), the MMPA provides for NMFS to authorize the incidental, but not intentional take of marine mammals, provided the agency finds that the authorized take will have no more than a negligible impact on the species and will not have an unmitigable impact on the availability of the species for taking for subsistence purposes:

> U.S. citizens who engage in a specified activity other than commercial fishing (which is specifically and separately addressed under the MMPA) within a specified geographical region may petition the Secretaries to authorize the incidental, but not intentional, taking of small numbers of marine mammals within that region for a period of not more than five consecutive years (16 U.S.C. 1371(a)(5)(A)). The Secretary "shall allow" the incidental taking if the Secretary finds that "the total of such taking during each 5 year (or less) period concerned will have a negligible impact on such species or stock and will not have an immitigable [sic] adverse impact on the availability of such species or stock for taking for subsistence uses." If the Secretary makes the required findings, the Secretary also

prescribes regulations that specify (1) permissible methods of taking, (2) means of affecting the least practicable adverse impact on the species and their habitat, and (3) requirements for monitoring and reporting. The regulatory process does not authorize the activities themselves, but authorizes the incidental take of the marine mammals in conjunction with otherwise legal activities described within the regulations.

Similar to promulgation of incidental take regulations, the MMPA also established a process by which citizens of the United States can apply for an authorization to incidentally take small numbers of marine mammals where the take will be limited to harassment (16 U.S.C. 1371(a)(5)(D)). These authorizations are limited to one-year and, as with incidental take regulations, the Secretary must find that the total of such taking during the period will have a negligible impact on such species or stock and will not have an immitigable adverse impact on the availability of such species or stock for taking for subsistence uses. The Service refers to these authorizations as Incidental Harassment Authorizations.

To authorize such incidental take or incidental harassment, NMFS must prescribe means of effecting the least practicable impact on the species and must establish monitoring and reporting requirements.

Under these provisions, NMFS may not authorize incidental take or harassment of marine mammals, including the eastern DPS of Steller sea lions, if such take is likely to, or reasonably expected to, adversely affect the species' rates of survival or recruitment. To authorize incidental take, the agency must find that the total of such authorized take will have a negligible impact on the species or stock. NMFS regulations (50 CFR 216.103) define "negligible impact" as "an impact resulting from the specified activity that cannot be reasonably expected to, and is not reasonably likely to, adversely affect the population through effects on annual rates of recruitment or survival." This limitation, together with the general moratorium against taking, provides substantial protection against takes, whether intentional or incidental to a specified activity that would affect the continued growth of the eastern DPS Steller sea lion population.

The MMPA provides for NMFS to authorize the incidental take of marine mammals that are designated depleted because they are listed as threatened or endangered species by persons using certain commercial fishing vessels (16 U.S.C. 1371(a)(5)(E)). Among other limitations, to authorize such take, NMFS must first determine that the take will have no more than a negligible impact on the species or stock (see 75FR81972, December 29, 2010).

The intentional lethal take of any marine mammal during commercial fishing is prohibited unless such taking is "imminently necessary in self-defense or to save the life of a person in immediate danger," and is promptly reported (16 U.S.C. 1371(c); 16 U.S.C. 1387(a)(5)). In addition, the provisions of section 118 of the MMPA (16 U.S.C. 1387), apply to take of all marine mammals by commercial fisheries. Section 4.3.3.2 discusses these provisions and concludes that the level of incidental take of eastern DPS Steller sea lions that has occurred and that is likely to occur in the future is not likely to have population-level effects such that would place the species at risk of extinction within the foreseeable future.

The MMPA provides a mechanism to permit deterring, moving, hazing or intentionally (non-lethally) taking individual marine mammals for certain purposes. These include the use of measures:

i. by the owner of fishing gear or catch, or an employee or agent of such owner, to deter a marine mammal from damaging the gear or catch;
ii. by the owner of other private property, or an agent, bailee, or employee of such owner, to deter a marine mammal from damaging private property;
iii. by any person, to deter a marine mammal from endangering personal safety; or
iv. by a government employee, to deter a marine mammal from damaging public property, so long as such measures do not result in the death or serious injury of a marine mammal.

Furthermore, in the event the eastern DPS Steller sea lion is delisted and found to no longer be depleted, the MMPA (16 USC 1389: section 120(a)) provides that a:

> State may apply to the Secretary to authorize the intentional lethal taking of individually identifiable pinnipeds which are having a significant negative impact on the decline or recovery of salmonid fishery stocks which—
>
> A. have been listed as threatened species or endangered species under the Endangered Species Act of 1973 (16 U. S.C. 1531 et seq.);
> B. the Secretary finds are approaching threatened species or endangered species status (as those terms are defined in that Act); or
> C. migrate through the Ballard Locks at Seattle, Washington.

Such a mechanism has been considered to move, haze or kill California sea lions that prey upon ESA listed salmon and steelhead in Idaho, Washington and Oregon (76FR56167, September 12, 2011; http://www.nwr.noaa.gov/Marine-Mammals/Seals-and-Sea-Lions/States-MMPA-Request.cfm). Two Steller sea lions were taken in traps at the Bonneville Dam in 2008 (K. Wilkinson, unpublished NMFS NWR data). If the eastern DPS is delisted, given that the number of Steller sea lions observed in the area are similar to, or at times greater than, that reported for California sea lions (Stansell et al. 2011), it is reasonable to expect these States may apply for an exemption under MMPA Sec. 120 to lethally remove eastern DPS Steller sea lions at the Bonneville Dam in order to protect ESA listed stocks of migrating salmonids. If such an exemption was granted and the authorized level of taking was similar to that previously authorized (but since withdrawn) for California sea lions at the site (anticipated annual take was 30-85 animals), it is likely the level of take would not cause the eastern DPS of Steller sea lions to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

The MMPA exempts Alaska Natives from the prohibitions on the taking of marine mammals, including eastern DPS Steller sea lions, for subsistence purposes. Sections 101(b)(3) and 103 of the MMPA provide for subsistence harvest regulations for marine mammal stocks designated as depleted under that Act, after notice and administrative hearings as prescribed by the MMPA. No such regulations have been adopted for the subsistence harvest of eastern DPS Steller sea lions. As discussed above, the average annual level of subsistence take represents a small fraction of the overall population, has not impeded the recovery of the species, and is not expected to affect the continued growth of the DPS.

As discussed above, we have not identified any present or future sources of disturbance, injury, or lethal take (i.e., potential threats) that are likely to place the eastern DPS of Steller sea lions at risk of extinction within the foreseeable future throughout all or a significant portion of its range. Therefore, NMFS

concludes that the MMPA's moratorium on take of marine mammals, though subject to exceptions, affords adequate protection to the eastern DPS Steller sea lion population against such potential threats.

Protection for Habitat under the MMPA:

As described in Cameron et al. (2010), the MMPA places an emphasis on ecosystem and habitat protection:

> The habitat and ecosystem goals set forth [in section 2 of the MMPA] include: (1) management of marine mammals to ensure they do not cease to be a significant element of the ecosystem to which they are a part, (2) protection of essential habitats, including rookeries, mating grounds, and areas of similar significance "from the adverse effects of man's action", (3) recognition that marine mammals "affect the balance of marine ecosystems in a manner that is important to other animals and animal products" and that marine mammals and their habitats should therefore be protected and conserved, and (4) directing that the primary objective of marine mammal management is to maintain "the health and stability of the marine ecosystem." Congressional intent to protect marine mammal habitat is also reflected in the definitions section of the MMPA. The terms "conservation" and "management" of marine mammals are specifically defined to include habitat acquisition and improvement [(MMPA section 3)].

The MMPA's moratorium against take of marine mammals, including the eastern DPS Steller sea lion, provides a measure of protection to marine mammal habitat when that habitat is occupied by marine mammals. Terrestrial habitat sites such as rookeries or haulouts are used for important behaviors, including breeding, rearing and nursing pups, resting, and seeking refuge from marine predators. Marine habitats are used for behaviors that include feeding and migration. Any activity with the potential to disturb an eastern DPS Steller sea lion by disrupting such behaviors could constitute harassment that would be prohibited under the MMPA unless otherwise authorized. Therefore, the MMPA's moratorium against take of marine mammals protects many of the important attributes of occupied habitat of the eastern DPS, albeit indirectly.

As discussed above, we have not identified any threat that would destroy, modify or curtail eastern DPS habitat such that the species is likely to become in danger of extinction within the foreseeable future (section 4.3.2). Therefore, the indirect protection of habitat afforded by the take prohibition of the MMPA, together with the additional protections for habitat discussed below (sections 4.3.5.3 – 4.3.5.8) appear adequate to protect against any foreseeable risk of destruction, modification, or curtailment of eastern DPS habitat.

Moreover, should it become necessary to protect specific habitat of the eastern DPS in the future, the MMPA provides authority that NMFS could use to develop additional and specific protections for Steller sea lion habitat. Section 112(a) of the MMPA provides an existing mechanism that NMFS could use to develop future regulations to protect eastern DPS habitat. NMFS has used this authority to regulate vessel approach to certain marine mammals (60 FR 3775; 62 FR 6729; 66 FR 29502) or to limit vessel speed in certain marine habitats during times that correspond to North Atlantic Right whale occurrence. Baur et al. (1996) noted that this section of the MMPA could be used to protect marine mammal habitat:

> section 112 authorizes the Secretary to "prescribe such regulations as are necessary and appropriate to carry out the purposes of the MMPA" (Id. § 1382(a)). This authority can be

> used to promulgate regulations to protect habitat areas. In the legislative history of the 1994 Amendments, Congress made it clear that section 112 includes such authority. As stated by the House Merchant Marine and Fisheries Committee in its legislative history for amendments to section 2(2), by adding the phrase "essential habitats," "[t]he Committee believes that the Secretary currently has the authority to protect marine mammals and their habitats under the general rulemaking authority of section 112 of the MMPA" (H.R. Rep. No. 439, 103d Cong., 2d Sess. 29 (1994)). The Committee expressly noted, as an example, that this authority would apply "to protect polar bear denning, feeding, and migration routes . . . ." (Id.).

However, at present, existing protections afforded to eastern DPS Steller sea lion habitat appear adequate. As described above, NMFS has not identified any threats to the habitat of the eastern DPS that likely would cause the species to become in danger of extinction in the foreseeable future throughout all or a significant portion of its range (section 4.3.2).

Protections Against Take Under the ESA:

The ESA includes a prohibition against take of listed species that prohibits many of the same acts that are prohibited under the MMPA's moratorium on take. Both prohibitions are subject to an exception for take by Alaska Natives for subsistence purposes. The definition of "take" under the ESA is, on its face, more broad than the MMPA's definition of the term. The ESA provides that "take" "means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct" (16 U.S.C. 1532(19)). As discussed below, the prohibition against take in the ESA may, in some narrow circumstances, provide protection that may not be provided by the MMPA's moratorium on take. This added measure of protection would be eliminated if the species is removed from the list of threatened species. However, as discussed above, we have not identified human caused mortality or disturbance as potential threats that render the species in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

Protections for Habitat and Section 7 Consultations Under the ESA:

Unlike the MMPA prohibition against take, the ESA's prohibition against take expressly prohibits "harm," to a listed species, which may include "significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering" (50 C.F.R. 17.3; Babbitt v. Sweet Home Chapter of Communities for a Great Oregon_, 115 S. Ct. 2407, 1995). Thus, the ESA's take prohibition may afford added protection against a narrowly defined class of degradation to habitat of a listed species. The ESA may afford protection against degradation to habitat that occurs when the habitat is not actually occupied by an individual animal, such degradation does not actually disrupt the animal's behaviors, and such degradation actually kills or injures the animal.

The ESA provides a level of habitat protection by requiring the designation of Critical Habitat for a listed species (16 U.S.C. Section 1533(a)(3)(A); (b) (6)(C)(ii); see Figures 3.1-3.3), and by providing for consultations on federal agency actions to ensure that such actions do not jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat for the species. Under the ESA, federal agencies proposing actions that "may affect" listed species must consult with NMFS or FWS. As part of this consultation, NMFS (the responsible agency in the case of Steller sea lions) prepares a Biological Opinion to determine whether the subject federal action (project) is likely to jeopardize the continued existence, or to adversely modify the critical habitat, of any listed species in the

project area. If a finding of jeopardy or adverse modification is made, then NMFS must prepare Reasonable and Prudent Alternatives that outline how the action must be modified to avoid jeopardy and adverse modification. In the event the eastern DPS Steller sea lion is removed from the ESA, federal agencies would no longer be required to consult with NMFS to ensure that their actions do not jeopardize the continued existence of the eastern DPS or destroy or adversely modify its critical habitat.

During the time that the eastern DPS has been listed as a threatened species, NMFS has completed section 7 consultations on numerous proposed actions by federal agencies. NMFS has not concluded that any of these actions are likely to jeopardize the continued existence of the eastern DPS Steller sea lion or adversely modify critical habitat within the breeding range of the eastern DPS Steller sea lion. Therefore, NMFS has not suggested reasonable and prudent alternatives to any of the proposed actions in order to protect the eastern DPS. We do recognize, however, that in the context of any formal consultations where NMFS authorized incidental take of eastern DPS Steller sea lions, the agency's incidental take statements did impose reasonable and prudent measures to minimize the impact of such takes. If the species is delisted, the agency would not impose such measures for future federal agency actions. Moreover, in this status review, we have considered current and potential future threats to the eastern DPS Steller sea lion, including threats to its habitat, but have not identified any current or potential future threats, including future federal agency actions, that would cause this species to be in danger of extinction throughout all or a significant portion of its range in the foreseeable future (Sections 4.3.2, 4.3.3, 4.3.4, 4.3.6).

Protections under the MMPA that may be affected by a decision to delist the eastern DPS:

By default, marine mammal populations listed either as endangered or threatened under ESA are categorized as depleted under MMPA (Baur et al. 1996). If the eastern DPS of Steller sea lion is removed from the list of threatened species, their depleted designation under the MMPA also could be removed following a demonstration that they are not below their optimum sustainable population (OSP) level (see below).

Optimum sustainable population. In the event the eastern DPS of Steller sea lion is delisted, NMFS will be required, under the MMPA, not to permit the population to "diminish beyond the point at which it is a significant functioning element in the ecosystem of which they are a part, and not permit it to diminish below the optimum sustainable population" (Id. § 1361(2)). At this time OSP for the eastern DPS Steller sea lion has not been determined. Allen and Angliss (2011) summarized that "…the status of this stock relative to its …" OSP "is unknown."

Under the MMPA, OSP means:

> [W]ith respect to any population stock, the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element…

According to NMFS MMPA implementing regulations (50 C.F.R. § 216.3), OSP "…is a population size which falls within a range from the population of a given species or stock which is the largest supportable within the ecosystem to the population level that results in maximum net productivity. Maximum net productivity is the greatest annual increment in population numbers or biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality." Maximum net productivity level (MNPL) is defined as "the greatest net annual increment in population numbers or

biomass resulting from additions to the population due to reproduction and/or growth less losses due to natural mortality" (16 U.S.C. § 1362(9)).
If a stock is depleted, there are restrictions placed on the granting of permits for take (see Sections 3B, 4, and 5), except for scientific research, species enhancement, photographic purposes (Baur et al. 1996), although after the 1994 MMPA amendments most commercial fishing take is no longer prohibited (see below) and incidental take in some non-fisheries activities can also be authorized, given certain findings.

Strategic Stock. The MMPA includes the concept of a strategic stock, defined as "…a marine mammal stock—

(A) for which the level of direct human-caused mortality exceeds the potential biological removal level;
(B) which, based on the best available scientific information, is declining and is likely to be listed as a threatened species under the Endangered Species Act of 1973 [16 U.S.C. 1531 et seq.] within the foreseeable future; or
(C) which is listed as a threatened species or endangered species under the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.), or is designated as depleted under this chapter."

NMFS is required under the MMPA to annually review the stock assessments for each strategic stock. Because it is currently listed as threatened, the eastern DPS currently falls under this requirement. If this DPS is delisted, NMFS would likely shift to updating its status review every 3 years, unless significant new information is available or the species is determined to be a strategic stock for one of the reasons given above. If monitoring is sufficient to detect a downward trend in abundance, this change in classification under the MMPA should not reduce protections sufficiently to pose a threat to the long term viability of this species.

Conclusion

Based on this review, we conclude that in the event the eastern DPS Steller sea lion is delisted, the MMPA will provide a variety of regulatory measures designed to provide protection from unauthorized disturbance, and will ensure any such taking occurs only through a regulated process, so as to ensure the eastern DPS Steller sea lion continues to recover and remain a fully functional part of the marine ecosystem. It also provides a mechanism to provide protection to eastern DPS Steller sea lion habitat in the future if a threat arises which necessitates such protection.

4.3.5.3 U.S. Protected Areas

Protective federal land and water area designations provide benefit to the eastern DPS of Steller sea lions and their habitat in various parts of the range. For example, National Park designation (e.g., in the Channel Islands in California and the Olympic National Park in Washington), and National Wildlife Refuge establishment (e.g., as in the Alaska Maritime refuge), afford various levels of protection by prohibiting certain kinds of habitat modifications and activities that could harm or harass marine mammals. In a few locations (e.g., Oregon Islands National Wildlife Refuge (coast-wide) and Three Arch Rocks National Wildlife Refuge (Tillamook County, North Coast)), all refuge rocks, reefs, and islands are closed to public use and FWS requests all aircraft to maintain a 2,000-foot minimum Above Ground Level altitude over all NWRs including the rocks, reefs, and islands along the Oregon coast in order to minimize disturbance to wildlife. The Three Arch Rocks NWR is closed to public use and waters within 500 feet of the Refuge are closed to all watercraft from May 1 through September 15. "All rocks and islands used by SSL in Oregon are included in National Wildlife Refuges" (ADF&G et al. 2011).

ADF&G et al. (2011) specified that "Human activity on" these "refuges is prohibited except by Special Use Permit primarily limited to research and management activities." This information, considered in whole, indicates that key Steller sea lion terrestrial habitats, and aquatic areas very near to these sites in Oregon are afforded a relatively high level of protection, excepting the allowance of vessels to approach to 500 feet during key periods for Steller sea lions, and to, apparently, approach closer between September 16th to April 30th.

ADF&G et al. (2011) also provided information related to U.S. protected area designations related to Steller sea lion habitat in Washington State:

> "All rocks and islands used by SSL on the Washington Coast are also under federal protection, which is generally overlapping. There are three National Wildlife Refuges: Copalis, Flattery Rocks, and Quillayute Needles, as well as the Olympic National Park and the Olympic Coast National Marine Sanctuary. Carroll Island and Sea Lion Rocks are likely the most critical habitat on the Washington Coast since they host large numbers and support an increasing number of births (25 in 2010); they are included in the Quillayute Needles National Wildlife Refuge. Protection of SSL haulouts in inshore waters is not universal, but is still fairly comprehensive. Three National Wildlife Refuges: Dungeness, Protection Island, San Juan Islands, protect several important SSL haulout and foraging areas…."

ADF&G et al. (2011) identified the following Federally Protected Areas within the range of the eastern DPS: Glacier Bay National Park and Preserve, Wrangell-St. Elias National Park and Preserve, Alaska Maritime National Wildlife Refuge, and Tongass National Forest.

There also are Alaska state marine parks within the range of the eastern DPS (see details in ADF&G et al. 2011).

4.3.5.4 National Parks and National Marine Sanctuaries

During the public comment period related to this status review, the National Park Service provided NMFS with a data file "Data from the NPS ESA Database for 2007-2009 for park status, trends, and expenditures for Steller sea-lion." These data were from six national parks that currently have "populations" of Steller sea lions: Glacier Bay National Park (NP), Golden Gate NP, Olympic NP, Point Reyes NP, Redwood NP and Wrangell-St. Elias NP. The NPS identified one park, Channel Islands NP that historically had a "population."

The overall mission of the NPS (Organic Act 16USC1) is:

> to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.

Furthermore, the NPS has an explicit mission goal to protect, restore, and maintain in good condition natural and cultural resources and associated values and to manage those resources within their broader ecosystem context (NPS Strategic Plan 2001-2005). Clearly these statements support protection of wildlife (including Steller sea lions), their habitat, and the ecosystems on which they depend within the parks.

Several National Marine Sanctuaries (NMS) also contain Steller sea lion habitat occupied by the eastern DPS, these include the Olympia Coast, Cordell Bank, Farallon Islands, Monterey Bay, and Channel Islands NMS. NMSs are established and managed under provisions of the National Marine Sanctuaries Act (NMSA). As clarified by the NMS program website, this act provides tools that protect designated sanctuaries and living resources within them. For example, the:

- The NMSA requires federal agencies whose actions are "likely to destroy, cause the loss of, or injure a sanctuary resource," to consult with the program before taking the action. The program is, in these cases, required to recommend reasonable and prudent alternatives to protect sanctuary resources. [See section 304(d) of the NMSA.]

- The NMSA authorizes NOAA and the program to assess civil penalties (up to $130,000 per day per violation) for violations of the NMSA or its implementing regulations and damages against people that injure sanctuary resources. [See sections 306, 307, and 312 of the NMSA.]
- The NMSA provides the program with the authority to issue regulations for each sanctuary and the system as a whole. These regulations can, among other things, specify the types of activities that can and cannot occur within the sanctuary. [See section 308 of the NMSA.]

- The NMSA requires the program to prepare and periodically update management plans that guide day-to-day activities at each sanctuary. [See sections 304(a) and 304(e) of the NMSA.]

An example of protections that specifically exist because of the NMS, park, or other special designation are protections put in place by the Monterey Bay National Marine Sanctuary to restrict motorized personal watercraft, an activity known to have the potential to disturb sea lions on haulouts, rookeries, or in the water.

4.3.5.5 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSFMCA) is the primary domestic legislation governing management of the nation's marine fisheries. Because the eastern DPS of Steller sea lion is currently listed under the ESA, NMFS is required to consult under Section 7 on its authorization and management of such fisheries if Steller sea lions or their critical habitat may be affected. If NMFS removes the eastern DPS from the list of threatened species, NMFS would no longer be required to consult over such effects of its authorization and management of fisheries. The food requirements of marine mammals are factored into fishery management plans and assessment models as components of the ecosystem that contribute to natural mortality of the subject species. Additionally, in the event the eastern DPS Steller sea lion is removed from the list of threatened species, NMFS will continue to consider the effects of proposed fishery management measures to eastern DPS Steller sea lions through NEPA analyses of Fishery Management Plans, amendments, and associated regulations.

4.3.5.6 National Environmental Policy Act

NEPA became law in 1969. NEPA established a public policy and procedural framework designed to ensure that before any proposed federal action is approved by a federal agency, the agency evaluates the impacts of its actions on the human environment, informs the public of those impacts and considers other alternative courses of action that reduce such impacts. The human environment is defined as being

comprised of the physical, biological, economic, and social environment in the affected area. To document this process, NEPA requires federal agencies to prepare analyses of the potential environmental effects of each action alternative (e.g, an Environmental Impact Statement or EIS). NEPA does not require an agency to adopt the alternative with least environmental effects; rather, the law established a public process where the agency evaluates alternatives that meet the agency's purpose and need for the action and, after evaluating the environmental impacts of the alternatives, makes an informed choice among the alternatives. NMFS routinely provides review and comment on draft and final Environmental Assessments (EAs) and EISs issued under NEPA used to assess the consequences of proposed federal actions that may interact with Steller sea lions, other trust resources and their habitat. These reviews often recommend design alternatives and protective measures to avoid, reduce, and mitigate any adverse effects to marine mammals such as the eastern DPS of Steller sea lions. Such reviews are expected to continue, and perhaps to play a more important future role in conservation of the eastern DPS Steller sea lion in the event it is delisted.

4.3.5.7 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act (FWCA) was enacted to protect fish and wildlife when federal actions result in the control or modification of a natural stream or water body. The statute requires federal agencies to take into consideration the effect of such development on fish and wildlife resources; to take action to prevent injury to these resources; and provide for the development and improvement of these resources. The statute requires consultation with the U.S. Fish and Wildlife Service or NMFS (as appropriate) to develop measures to protect, develop, and improve wildlife. Where possible, the federal action agency must incorporate the recommendations of these agencies into project plans.

4.3.5.8 State Laws

In addition to the federal statutes described above, various state laws and land use policies are significant to the recovery and management of Steller sea lions. Although state laws directly governing sea lions or other marine mammals are preempted by the MMPA (Baur et al. 1996), a number of state laws intended to protect a variety of species provide benefits to marine mammals including Steller sea lions.

> ADF&G et al. (2011:2) specified that "…the Oregon Department of Fish and Wildlife has seasonal (reproductive season, April-August) closures for sport and commercial fisheries in the areas within 1000 feet of the three primary rookeries on the South Coast (one at Rogue Reef and two at Orford Reef). The Oregon State Marine Board also established a closure to all vessel traffic within 500 feet of the North Oregon Coast rookery at Three Arch Rocks."

State based enforcement and public education associated with these laws can help to reduce human disturbance to resting or breeding animals.

Given the potential for Steller and California sea lions to interact with commercial fisheries, California state law has included restrictions on gill net and trammel fisheries since the early- and mid-1980s (see details in Baur et al. 1996).

The State of Alaska has implemented various fisheries regulations that either directly or indirectly to reduce the impact of commercial fishing to Steller sea lions from disturbance, competition for prey, and incidental taking. Some of these steps are described in Section 4.4.5.9 and Appendix 2.

4.3.5.9 Protections in Canada

A significant portion of the eastern DPS of Steller sea lion inhabits areas within Canada. Thus, protections in Canada are relevant to assessing the overall level of protection for this population. In Canada, protection of key habitat is afforded by measures including, but not limited to: 1) the location of the habitat within Ecological Reserves (e.g., the rookeries at Triangle and Beresford Islands) which are closed to entry except as authorized by a permit or within a National Park Reserve (e.g., the rookeries at Cape St. James and Garcin Rocks); 2) Marine mammal mitigation procedures developed to mitigate disturbance due to tactical sonar (Department of National Defense (2007); and 3) Regulatory tools to protect against adverse environmental effects from PBDE contamination and from ship-based pollution (DFOC 2011:30-31).

The waters surrounding Gwaii Haanas, which include the rookeries at Cape St. James and new rookery at Garcin Rocks, were recently designated a Marine Conservation Area and the waters surrounding the rookery at Triangle Island have been proposed as a Marine Wildlife Area. These designations enhance the protection of sensitive areas and habitats, and limit (but do not exclude all) human activities.

DFOC (2011) summarized provisions of the Marine Mammal Regulations of the *Fisheries* Act prohibiting disturbance of marine mammals, unless authorized by a scientific or fishing license. Guidelines have been developed to address disturbance in Canada due to close approaches on land and sea; such guidelines are "often" followed for pinniped viewing. Violations involving disturbance to Steller sea lions are prosecuted in the courts. Educational and management actions have been implemented with the ecotourism industry to enhance compliance with these guidelines. The "Statement of Canadian Practice with respect to the Mitigation of Seismic Sound in the Marine Environment" (DFOC 2007: available at http://www.dfo-mpo.gc.ca/oceans/management-gestion/integratedmanagement-gestionintegree/seismic-sismique/pdf/statement-enonce-eng.pdf) specifies requirements for mitigation during the planning and conduct of marine seismic surveys. These requirements were developed to minimize impacts on life in the oceans and were set as minimum standards that will apply in all non-ice covered marine waters in Canada. Key requirements are given in the Statement (http://www.dfo-mpo.gc.ca/oceans/management-gestion/integratedmanagement-gestionintegree/seismic-sismique/pdf/statement-enonce-eng.pdf).

Steller sea lions in Canada are designated as a species of "special concern" under the Species at Risk Act (SARA). With respect to harvest controls, they are protected from commercial hunting and culls under the Marine Mammal Regulations of the federal *Fisheries Act*. No person, other than a First Nation person, can "fish for" or disturb any marine mammal unless this has been explicitly authorized by a license (DFOC 2011). DFOC (2001) clarified that while First Nation peoples do not need a license to hunt a marine mammal for social, food, or ceremonial purposes, the use of Communal Licenses with harvest limits is common. While commercial harvest and culls have not been authorized by management provisions since 1970, licenses have been issued that allow Steller sea lions to be killed to protect fish in herring impoundments and fish farms which allowed for limited harvest of "nuisance animals," subject to monitoring requirements to ensure removals were within sustainable levels. Recent changes to Marine Mammal Regulations have exempted licensed aquaculture farms from the prohibition on killing as a condition of the license. The designation of the Steller sea lion as a Species of Special Concern is currently being reviewed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and if delisted under SARA, killing of this species might be expected to resume.

Monitoring and assessment are key to ensuring a species' protection. Without information from such programs, it is not possible to detect whether factors, known or not, are having an adverse effect on the population, such that it is beginning to decline and/or to show other signs (e.g., poor body condition) of reduced population vitality. DFOC (2001) noted that, following a recommendation in the original 1992 Recovery Plan, Canadian and U.S. researchers have made efforts to standardize census techniques and coordinate survey schedules. The effectiveness of this coordination and standardization was demonstrated in the first survey of the population over its entire range (Pitcher et al. 2007) and continues to date.

In January 2011, Canada finalized a Management Plan for the Steller sea lion. DFOC (2011:32) specified two management goals for the plan:

- To ensure that anthropogenic threats from Canadian sources do not cause unsustainable population declines, or a contraction of the current range or number of breeding sites in Canada.

- Support for, and contribution to, an environment where research and monitoring of Steller Sea Lions in B.C. contributes to achieving an improved global knowledge of the Eastern Pacific Population.

This plan articulates: historical and current status; ecological needs; the history of management in Canada; knowledge gaps; needed research; management goals and assessment of threats; population and distribution objectives for management; research and monitoring objectives and needed management, research, monitoring, and outreach and communication. Hence, Canadian managers have developed a detailed framework to guide their management of this species. As was the case with the revision of the Recovery Plan (NMFS 2008), both the process of developing such a framework and the existence of the framework itself helps focus attention on Steller sea lion status and increases the probability that high priority tasks needed to conserve this species are accomplished.

4.3.5.10 Conclusion for Factor D

Based on information and analysis in the Recovery Plan (NMFS 2008) and updated here, this review finds:

- The MMPA provides a variety of existing regulatory measures designed to provide protection from unauthorized disturbance, and will ensure any taking occurs only through a regulated process that prevents adverse effects on the population through effects on annual rates of survival or recruitment, so as to ensure the eastern DPS Steller sea lion continues to recover and remain a fully functioning part of the marine ecosystem. In addition, although we have not identified any serious threats to eastern DPS habitat in the foreseeable future, the MMPA provides a mechanism for future regulations to protect habitat of the eastern DPS if threats to its habitat emerge.

- Protections afforded by the location of key terrestrial and aquatic habitats within state and federal parks and marine protected areas offers additional protections for the eastern DPS of Steller sea lion.

- Federal regulations and management plans established by the government of Canada provide protection for eastern DPS Steller sea lions and their habitat in that country. Cooperative

programs between the US and Canada support research and monitoring necessary for ensuring the long term health and well being of this population within Canadian waters.

- There are a number of other federal and state statutes including the MSFCMA, NEPA, Clean Water Act, and the Marine Sanctuaries Act that will continue to provide protection to wildlife and habitat and will likely foster the continued growth and stability of this population.

Given the lack of identified threats (e.g., sections 4.3.2-4.3.6, above) to the continued survival and expansion of this population within the foreseeable future, NMFS concludes that the protections afforded by existing regulatory mechanisms make it unlikely that the eastern DPS will become in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

To address and fulfill aspects of Listing Factor D, the Recovery Plan (NMFS 2008) noted:

> One potential threat to Steller sea lions is increased human disturbance in previously remote areas. Little is known about the potential impacts from changes to the physical environment, disturbance due to vessel traffic, or tourism related activities. Because of lack of information, it is not possible to quantify these threats. However, the potential threat from increased human disturbance highlights the need to keep regulatory mechanisms such as the MMPA in place to protect sea lions. Research and/or monitoring programs should be put into place to oversee activities that have the potential to negatively impact Steller sea lions. Other actions to protect haulout and pupping areas (as described under factor A) could provide substantial insurance against future impacts from development and anthropogenic disturbance. These actions are:
>
> 1. Agreement is reached with the State of Alaska which describes their fishery management plan, minimizes the take of Steller sea lions, and describes how future actions taken by the State will comport with the ESA and MMPA.
>
> 2. A Steller sea lion recovery coordinator is on staff at NMFS.

During the process of conducting this Status Review, NMFS and the State of Alaska, Department of Fish and Game, held meetings to discuss the above Recovery Plan recommendation for reaching an agreement clarifying how, in the event the eastern DPS of Steller sea lion is delisted, future State actions will continue to take into account biological and behavioral requirements of the stock and comport with existing federal regulation. NMFS recognizes the action recommended by the Recovery Plan was somewhat unclear as once the stock is delisted, ESA measures would no longer apply (unless of course the population declined substantially or was otherwise found to be under threat and re-listed). In addition, the Recovery Plan discussion seemed to focus on a desire to provide protection primarily from human disturbance, although it also specifically addressed fishery management activities, seemingly alluding to potential adverse effects of direct interaction (e.g., incidental take) and/or indirect effects of fisheries such as ecological alteration. The State of Alaska has provided correspondence that describes state fishery management plans, explains how existing practices followed by the State with respect to fisheries management have minimized the take of eastern DPS Steller sea lions and will continue to do so, and how such fishery management practices will contribute to continued recovery of the eastern DPS and will continue to comport with all aspects of the MMPA for the foreseeable future. NMFS has evaluated this material (Appendix 2) and has agreed with the State of Alaska that the described plans and management actions satisfy the recommended delisting action # 1.

NMFS has a Steller sea lion coordinator on staff. This satisfies recommended delisting action #2.

Therefore, NMFS concludes the actions identified under factor D in the Recovery Plan have been met.

4.3.6 *Factor E: Other Natural or Anthropogenic Factors Affecting Its Continued Existence*

4.3.6.1 Summary of Recovery Plan Discussion

Beyond those threats already discussed above, the Recovery Plan did not provide any further discussion regarding other factors that need to be identified, discussed, or considered under Listing Factor E.

With respect to Listing Factor E, the 2008 Recovery Plan noted the following criteria should be achieved and accomplished in such a way that delisting is not likely to result in re-emergence of the threat:

> To provide assurance that delisting is warranted for the eastern population of Steller sea lions, several actions are recommended to assure that factors do not develop that would threaten its persistence.
>
> 1. An outreach program is established to educate the public, commercial fishermen and others to the continued need to conserve and protect Steller sea lions.
>
> 2. An Alaska stranding network is in place and functional.

4.3.6.2 Outreach Program

Both NMFS and the Alaska Department of Fish and Game (ADF&G) have outreach programs devoted to Steller sea lion conservation and management in an effort to educate commercial fishermen and the general public about the ongoing need to protect and conserve Steller sea lions. Much of the outreach to date has focused on the conservation issue of Steller sea lion ingestion of gear and entanglement in marine debris. Although the state and federal agencies address this outreach campaign independently, much of the effort occurs through a coordinated and integrated working group called the Pinniped Entanglement Group (PEG). PEG meets regularly with the goal of minimizing and/or eliminating the negative effects of marine debris and fishing gear on pinnipeds. Its work focuses primarily on Steller sea lions and northern fur seals. Members of PEG include staff from NMFS Protected Resources Division, ADF&G's Steller Sea Lion Program, NOAA's Marine Debris Program, Oregon State University, the Marine Conservation Alliance, and other interested stakeholders. Many of the outreach products and initiatives described below have originated through PEG.

NMFS Alaska Region and Northwest Region have Marine Mammal Stranding Programs that provide outreach related to Steller sea lion conservation. In 2009, NMFS Alaska Region instituted a 24-7 Marine Mammal Stranding Hotline (877-925-7773) to receive reports of stranded marine mammals, including both dead animals and live animals in distress. Many cases of stranded Steller sea lions both live and dead have been reported by the public using this communication tool in the last several years. The Northwest Region also maintains a Marine Mammal Stranding Hotline (800-853-1964) and receives both live and dead Steller sea lion reports. A web-reporting tool also exists, and regular newsletters are prepared and distributed by NMFS with contributions from stranding network members to alert responders to marine mammal conservation issues of concern. In 2011, the NMFS Alaska Stranding

Program produced stranding brochures and wallet cards with program information and the hotline number.

The following descriptions detail outreach materials and activities aimed at educating both the general public and fishing industry about the need to conserve and protect Steller sea lions:

Entanglement Video: A number of products have been created specifically to address Steller sea lion entanglement. An 11-minute educational video called "Entanglement of Steller sea lions in marine debris: Identifying causes and finding solutions" was produced in 2008 by the ADF&G and Sea Gypsy Productions which addresses the problem of Steller sea lion entanglement in marine debris. The video describes how sea lions become entangled, the most common sources of entangling debris, and what the public can do to help reduce the number of entanglements. Numerous presentations have been made using this video at scientific meetings and conferences, trainings, workshops and schools in Alaska and Oregon. These events include Sitka Whalefest, the Alaska Marine Mammal Stranding Network annual meeting, the Alaska Marine Science Symposium, and the International Marine Debris Conference. The targeted audience for this video includes commercial and sport fishing organizations, tour boat companies, tourists, the marine recreational community, students, and the general public. This video has been distributed to government agencies, non-profit organizations, tribal councils, and fishing groups within Alaska and the Pacific Northwest, aquariums, zoos, and conservation groups throughout the United States and the world.

Interpretive Displays: NMFS and ADF&G have collaborated to develop 'Lose the loop!' harbor side entanglement displays. These permanent interpretive displays have been installed in harbors throughout Alaska to educate the public about marine mammal entanglements. These displays are currently affixed to harbors in Juneau, Sitka, Dutch Harbor, and Kodiak. Future installations are planned for the Pribilof Islands. The target audience for this interpretive material is commercial and sport fishing organizations, tourists, the marine recreational community, and the general public.

Entanglement Bumper Stickers: ADF&G and NMFS are producing bumper stickers with outreach messages designed to reduce marine entanglements and marine debris that threaten Steller sea lions. These will be distributed at various outreach events and educational opportunities. The target audience is commercial and sport fishing organizations, marine mammal subsistence hunters, tour boat companies, tourists, the marine recreational community, Alaska residents, and the general public. Bumper stickers are now available and being distributed.

Tide Books and Calendar Ads: ADF&G and NMFS have purchased ad space for educational messages in 2012 Alaska tide books and tide calendars promoting the "Lose the Loop" message to help reduce sea lion marine entanglements. This outreach message will be advertised in 400,000 Alaska tide books annually, and also will appear in the Juneau and Seldovia tide calendars.

Naturalist Training: Since 2008, NMFS and ADF&G have presented annually at a naturalist training workshop organized by the Alaska Fisheries Science Center TSMRI lab in Juneau on Steller sea lion biology, natural history, impacts of marine debris, and current research. The presentations are aimed at naturalists working on tour boats who are responsible for educating the public during Juneau's tour season.

Web Pages: NMFS Alaska Region maintains Steller sea lion program web pages to educate the public about conservation and management issues for the species. From this portal, users can access the

Recovery Plan, critical habitat maps, description of special protections, biological opinions, and fisheries regulations. Links to research topics are also provided. In addition, the Alaska Region website includes a page with Marine Mammal Viewing Guidelines and Regulations describing the federal *take* prohibition and includes a code of conduct for viewing marine mammals to avoid disturbance or harassment. Steller sea lion protection measures are provided here, and extra caution to prevent harassment of sea lions on rookeries and haulouts is advised.

NMFS Northwest and Southwest Regions maintain webpages on deterrence of pinnipeds, distinguishing for the public that only marine mammals not listed under the Endangered Species Act (ESA) may be deterred to protect private property, including gear and catch. ESA-listed and non-ESA-listed species of sea lions and seals are described on these pages. Authorized and humane methods of deterring non-ESA listed species are also provided on these sites, which will become important for the eastern DPS population of Steller sea lions if recovery warrants delisting.

ADF&G maintains numerous sea lion web pages which include research, conservation, and management topics. A central Steller sea lion program email address (dfg.dwc.sealions@alaska.gov) facilitates public contact and the ability to gather incidental brand-resight photographs.

NMFS links:
http://209.112.168.2/protectedresources/stellers/default.htm
http://www.fakr.noaa.gov/protectedresources/mmv/guide.htm
http://www.nwr.noaa.gov/Marine-Mammals/Seals-and-Sea-Lions/Deterring-Pinnipeds.cfm

ADF&G links:
http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.stellerresearch
http://www.adfg.alaska.gov/index.cfm?adfg=stellersealion.main
http://www.adfg.alaska.gov/static/education/wns/steller_sea_lion.pdf

Fishery Survey: During fall 2011, ADF&G began oversight of the development of a survey for commercial salmon trollers to assess the prevalence and impact of Steller sea lion-troll fishery interactions. The survey is a student project through UAF, in collaboration with ADF&G. The goal is to develop the survey, send it to salmon trollers in Southeast Alaska, and analyze survey results. Ideally, work could then begin with industries to develop ways to reduce Steller sea lion–troll fishery interactions.

Classroom Presentations: Sea lion biology and "Lose the Loop: Entanglements of Steller sea lions in marine debris" programs are presented to students in Alaska and in Oregon by ADF&G and a contractor through Oregon State University. Audiences include elementary, high school, and college students.

General Education and Outreach Presentations: Numerous outreach events conducted by NMFS and ADF&G occur annually on the issue of marine debris and sea lion entanglements, including identifying causes and finding solutions. Events include oral presentations, poster presentations, panel discussions, workshops, video presentations, news articles, and informal discussions. Venues have included conferences, industry peer-peer meetings, boat shows, council meetings, science centers, film festivals, documentaries, naturalist trainings, fairs, news magazines and articles, public radio, and television. These are expected to continue to occur into the foreseeable future.

Outreach Involving Alaskan Native Organizations: Beginning in 2008, NMFS entered into two cooperative agreements with The Alaska Sea Otter and Steller Sea Lion Commission (TASSC). Both of

these cooperative agreements, the second of which is still ongoing, included outreach and education projects on Steller sea lions. Completed projects included : 1) Convening of a workshop "Understanding and Working Through the Federal Administrative Process for Alaska Native Tribes and Marine Mammal Co-management Groups" This workshop was organized to provide attendees with a solid foundation and understanding of the federal administrative rule-making process, and relevant natural resource laws and policies (e.g., the MMPA, ESA, NEPA, tribal consultation and executive orders, etc.; 2) Development and dissemination of a calendar which presented information about Steller sea lion biology and status, relevant laws and regulations governing marine mammals, critical habitat, and traditional Alaska Native customary and traditional uses of marine mammals; 3) Quarterly newsletters which provided non-technical summaries of recent Steller sea lion research results, information about law and regulations, etc.; 4) Development and dissemination of a biosampling handbook for Alaska native subsistence hunters. This project was undertaken to enhance linkages between researchers and subsistence hunters and to attempt to obtain valuable samples from Steller sea lions harvested for subsistence; and 5) Updating and maintenance of the TASSC website to serve as a source of information and key links on topics related to Steller sea lions for Alaska native subsistence hunters and other interested readers. Many of these products are available to anyone with internet access and are provided directly to Alaska Native tribal organizations with membership in TASSC, including those in Southeast Alaska. Many of the Alaska Native Steller sea lion subsistence hunters are also involved in commercial fishing and/or from villages in which fishing is a major industry. However, these products may not be available much longer as this project has nearly completed its outreach activities. An education and outreach project that is still being developed is the revision, updating, and expansion of a handbook on the laws and regulations affecting Steller sea lions aimed at teens and young adults. More information can be found at http://www.seaotter-sealion.org/.

These considerable efforts are directed towards educating the public, commercial fishermen, Alaska Native organizations, and others to the continued need to conserve and protect Steller sea lions. Therefore, NMFS concludes that an active outreach program is in existence.

4.3.6.3 Alaska Marine Mammal Stranding Network

NMFS has a well-developed national stranding program (http://www.nmfs.noaa.gov/pr/health/networks.htm) and regional stranding networks. There are three regional (Alaska, Northwest, and Southwest Regions) marine mammal stranding networks within the U.S. range of the eastern DPS of Steller sea lion. These regional stranding networks include state, university, other federal, tribal, research, aquarium, and private partners who are part of the network. State networks exist within this framework (e.g., the Oregon Marine Mammal Stranding Network).

These Marine Mammal Stranding Networks provide considerable information to the public, such as summaries of strandings, causes of death of stranded animals (when known), etc. In addition to the U.S. national and related regional stranding programs, Canada has a staffed a Marine Mammal Incident Coordinator and the British Columbia Marine Mammal Response Network has been established consisting of federal and provincial government agencies, academics, aquaria and rehabilitation facilities, and NGOs. A Primary Response Manual has been developed and national stranding hotline established – referred to as "DFO's Observe, Record and Report 24-hour hotline."

The Alaska Region Marine Mammal Stranding Network was created to provide a consistent framework in which to collect and compile data about marine mammal strandings statewide. The network is composed

of state and federal wildlife and fisheries agencies, veterinary clinics, Alaska Native organizations, academic institutions, and others who respond to marine mammal strandings.

The Alaska program has grown significantly since the first stranding agreements were signed in the early 1990s. Currently, there are 14 organizations that hold active Stranding Agreements with NMFS Alaska Region. These members are distributed across the state, from Ketchikan to Dutch Harbor to Barrow. Most members, however, are located in southeast and southcentral Alaska (including Petersburg, Sitka, Tenakee, Gustavus, Juneau, Anchorage, Seward, and Kodiak), reflecting population centers and regions where most reported events occur. The Alaska SeaLife Center in Seward acts as the single rehabilitation facility for stranded marine mammals in the state. The operations of the Alaska network are highly collaborative, in part due to the unique challenges inherent in reporting and response across remote coastlines with few trained responders. Network members consistently coordinate efforts and pool resources to retrieve carcasses, send necropsy teams into the field, verify reports, and respond to entanglements or other cases of animals in distress.

Since its inception in 2002, the John H. Prescott Marine Mammal Rescue Assistance Grant Program has greatly enhanced capacity building and infrastructure development for the Alaska Stranding Network. Numerous organizations in Alaska have applied for and been awarded funding through this national competitive federal grant program, including the Alaska SeaLife Center, the University of Alaska Fairbanks, St. Paul Tribal Government, the Alaska Whale Foundation, Alaska Veterinary Pathology Services, and the North Slope Borough. Through this program, the Alaska SeaLife Center has been able to organize and host an annual meeting for the stranding network, which brings together agreement holders, researchers, managers, Alaska Native representatives, students, and veterinarians to exchange information, build collaborations, and work to promote successful response, safe protocols, and coordinated health investigations on marine mammals in Alaska. The 2012 meeting was the 7th annual meeting of the Alaska statewide network under this program.

The Alaska Stranding Network also receives annual trainings to develop skill sets, comply with safety standards, and stay current with national expectations and protocols. In recent years, network members have received training in the following: oil spill preparedness, safety, and response guidelines (HAZWOPER); the Incident Command System; aviation safety; necropsy protocols; large whale disentanglement response.

Through the Alaska Stranding Network, NMFS receives Steller sea lion stranding reports from various locations throughout their range on an annual basis. Reports include sea lions entangled in marine debris and cases of gear ingestion. Reports also include sea lions that have been shot, are ashore and acting sickly, and carcasses that are beach-cast or floating.

When resources allow, necropsies are performed in an effort to determine cause of death. Such response and examination enables the collection of samples for disease and contaminants surveillance; basic biological information; information about status and diet; information about human interactions, such as entanglements, shooting, ship strikes; etc. Data on human interactions inform conservation actions and management decisions for the species. Information on disease and other parameters from these cases contributes to further understanding of Steller sea lion biology and ecosystem health.

If an unusual pattern of Steller sea lion deaths is reported through the Stranding Network or other means, as for example in 2009-2010 in Southeast Alaska, the relevant information is provided to the Working Group on Marine Mammal Unusual Mortality Events (WGMMUME). This working group

evaluates the relevant facts and then makes a determination, using seven predetermined criteria, as to whether the pattern qualifies for a marine mammal unusual mortality event (UME) as it is defined under the MMPA: "a stranding that is unexpected; involves a significant die-off of any marine mammal population; and demands immediate response." Further details are provided about the WGMMUME at: http://www.nmfs.noaa.gov/pr/health/mmume/history.htm.

NMFS Alaska Region maintains a stranding program webpage which provides information to educate the public about the causes of strandings, the purpose of the network, and the diversity of biological, environmental and health parameters that are obtained from live and dead marine mammals. In addition, the website emphasizes that the public cannot pick up stranded marine mammals without authorization, but encourages assistance in both reporting and incident documentation to allow stranding network members to respond. This information can be given to NMFS online via the Marine Mammal Stranding Event Report Form or by phone via the NMFS statewide 24-hour Stranding Hotline: (877) 925-7773. Regional agency contact numbers are also provided, as well as Alaska SeaLife Center Stranding Hotline: (888) 774-7325.

As an Alaska stranding network is in place and fully functional, NMFS concludes this recommended delisting action has been met.

4.3.6.4 Conclusion for Factor E

Based on information and analysis in the Recovery Plan (NMFS 2008) and updated here, this review finds there are no other factors likely to cause the eastern DPS of Steller sea lions to become extinct within the foreseeable future throughout all or a significant portion of its range. The recommended delisting actions under Factor E have been met.

4.3.7 Have the recommended Recovery Plan delisting actions for the five ESA listing factors been met?

4.3.7.1 Actions recommended under delisting criteria A (habitat issues):

The Recovery Plan recommended:

> To provide assurance that delisting is warranted for the eastern population of Steller sea lion, threats to its habitat should be reduced as specified under this factor:
>
> 1. Marine habitats, particularly in regard to prey populations, must be maintained through appropriate fisheries management and control of contaminants.
> 2. Rookery and haulout sites need to be adequately protected (through state, federal, or private measures) to insure the continued use of these sites for pupping, breeding, attending young, and resting. Research and monitoring plans should be in place for all projects that have a high probability of negatively impacting sea lions in order to make sure that these activities do not result in harm to sea lions or their habitat.

Research and management programs have been identified in this review that provide for inclusion of Steller sea lion habitat requirements within fisheries management and other programs. Agreement between the State of Alaska and NMFS, ongoing research, law enforcement, and the Post Delisting

Monitoring Plan (below), as well as existing regulations under the MMPA that govern authorization for take of marine mammals, including eastern DPS Steller sea lions, provide a means to maintain marine habitats and prey populations and to monitor projects that are likely to adversely affect individual Steller sea lions, consistent with the above recommendations. Consistent with the primary goals of the MMPA, MSFMCA, NEPA, and other law, many avenues exist to ensure human activities do not result in harm to sea lions or their habitat. Moreover, as described above (section 4.3.2), we have not identified any threats to eastern DPS Steller sea lion habitat that are likely to cause the species to become in danger of extinction within the foreseeable future throughout all or a significant portion of its range. Therefore, NMFS concludes the actions recommended to meet this listing factor have been met.

4.3.7.2 Actions recommended under delisting criteria B (overutilization):

The Recovery Plan found:

> Human-caused mortality of Steller sea lions includes subsistence harvest; incidental takes in fisheries, illegal shooting, entanglement in marine debris, and take during scientific research. In general, the MMPA provides adequate protection for sea lions from the eastern population. None of these factors now appear to be preventing recovery, although it would be appropriate to reduce the magnitude of these when possible.

Research and management programs have been discussed and are in place to monitor and regulate these factors. Consistent with the primary goals of the MMPA, it is the goal of many of these programs to identify mechanisms to reduce or eliminate the magnitude of all of the above takings. Therefore, NMFS concludes the actions recommended to meet this listing factor have been met.

4.3.7.3 Actions recommended under delisting criteria C (disease, predation):

The Recovery Plan found that normal or background predation has not been limiting recovery. Diseases appeared "to be limited to those endemic to the population and are unlikely to have population level effects. Therefore no criteria are necessary to reduce disease and predation."

Review of new information available since the Recovery Plan was completed identified emergence of PDV within the range of the eastern DPS of Steller sea lions. There is an uncertain and unknown potential for this disease to cause adverse effects. However, there are a number of research and monitoring programs already in place or proposed here (see 5.2, below) that NMFS believes will provide adequate mechanisms for detecting, documenting, and responding to possible epizootic events such as that posed by the emergence of PDV. Through these mechanisms, NMFS and its partners will take action to address appropriately this issue, should it emerge. Therefore, NMFS concludes the actions recommended to meet this listing factor have been met.

4.3.7.4 Actions recommended under delisting criteria D (inadequate regulations):

The Recovery Plan recommended that:

1. Agreement is reached with the State of Alaska which describes their fishery management plan, minimizes the take of Steller sea lions, and describes how future actions taken by the State will comport with the ESA and MMPA.
2. A Steller sea lion recovery coordinator is on staff at NMFS.

NMFS finds these actions are in place; therefore, NMFS concludes the actions recommended to meet this listing factor have been met.

4.3.7.5 Actions recommended under delisting criteria E (other):

The Recovery Plan recommended several actions to assure that factors do not develop that would threaten the persistence of Steller Sea Lions:

1. An outreach program is established to educate the public, commercial fishermen and others to the continued need to conserve and protect Steller sea lions.

2. An Alaska stranding network is in place and functional.

NMFS concludes these recommended actions have been completed and are in place; therefore this listing factor has been met.

4.3.8 Final Conclusion of the review of the biological and threats based listing criteria

Based on information in the Recovery Plan and our review (above) of new information, NMFS finds:

- The biological (demographic) criteria for delisting have been met.

- The five ESA Listing Factors Criteria set forth in the Recovery Plan (NMFS 2008) have been met.

- None of the potential threats evaluated under the five ESA listing factors, individually or cumulatively, is likely to result in the species becoming in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

- The recommended delisting factor actions are in place.

- In the event the eastern DPS is delisted, NMFS concludes current measures under the MMPA, other laws, and regulations provide the protection necessary to ensure the continued recovery of the eastern DPS of Steller sea lions such that it is not likely to become an endangered species throughout its range within the foreseeable future.

5 RESULTS OF THE STATUS REVIEW

5.1 Conclusion

The Recovery Plan (NMFS 2008) concluded:

> …it is now apparent that the eastern DPS has been consistently increasing at about 3% per year throughout its range for about 25 years, with the exception of central California. The southernmost sites appear to have stabilized, albeit at levels far below their historical maximums. The eastern DPS has increased by about 225% over the last 25 years and four new rookeries have been established in Southeast Alaska. With the exception of the southern portion of the range,

> the reduced population size in the 1970s was thought to be the result of direct human related mortality, largely in the form of shooting by fisherman and others who viewed sea lions as competitors for fishery resources. With the passage of protective legislation in both the U.S. and Canada and with changing social values, this source of mortality has been substantially reduced. *Although there are still a number of factors that negatively impact the dynamics of the eastern DPS, none of these either alone or in combination appear to pose a threat to recovery.* (emphasis added).

Based on our review of the demographic criteria, ESA listing factors and associated criteria in this status review, NMFS finds that conclusions of the Recovery Plan remain valid. After a detailed review of the best available information since completion of the Recovery Plan, NMFS concludes that the biological (demographic) and ESA listing criteria for the eastern DPS of the Steller sea lion have been met and due to the low likelihood that it will become in danger of extinction in the foreseeable future throughout all or a significant portion of its range, the species should be considered for removal from the list of threatened species.

5.2 Recommended Recovery Actions: Status Review and Post-Delisting Monitoring Plan

Based on the lack of threats to the eastern DPS and the population status and trends, the Recovery Plan (NMFS 2008: VII-7) recommended a Status Review be conducted (implemented here) and that:

> A post delisting monitoring plan should be developed … which would guide monitoring activities for 10 years post delisting. The objective should be to ensure that necessary recovery actions remain in place and that it can be confirmed that there are no threats to the population's continued existence.

As noted previously (4.3.7.4), NMFS (2008) recommended under Listing Factor D an additional, but not numbered, recommended management action: "Research and/or monitoring programs should be put into place to oversee activities that have the potential to negatively impact Steller sea lions." In part these types of "programs" are already an integral component of ongoing research, existing stranding networks, and other management and enforcement programs implemented under the MMPA. These activities are conducted by NMFS in collaboration with other federal and state agencies, the North Pacific Fisheries Management Council, university affiliates, private research groups, or other NMFS permittees. As noted in the discussions above (e.g., 4.3.2, 4.3.3 and 4.3.5) there are many regulatory avenues already in existence that provide for both pre- and post- threats-based project review and monitoring that provide considerable protection to Steller sea lions and penalties for violation of such statutes.

However, the addition and implementation of a Post-Delisting Monitoring Plan (PDMP) will provide an additional degree of attention and an early warning system to ensure that delisting will not result in the re-emergence of threats to the population. The PDMP is intended to detect the response of the population to threats and/or to detect the re-emergence of threats. Following the guidance provided in the Recovery Plan NMFS has prepared a (draft) PDMP (Appendix 3).

5.3 New Recovery Priority Number: 10

NMFS established a recovery priority system to guide recovery task implementation and resource allocation (55FR24296; June 15, 1990). A numerical priority from 1 to 12 is assigned based on a matrix assigned to the magnitude of threats, recovery potential, and conflict (e.g., in conflict with construction,

development, or other economic activities) and the intensity of each (e.g., high-moderate-low). The Species Recovery Priority number for the eastern DPS of Steller Sea Lion is 10. This was the recovery priority number at the initiation of this status review, due to a low magnitude of threat, high recovery potential, and no significant potential for economic conflict. This number remains unchanged until regulations are issued to delist the eastern DPS of the Steller sea lion.

5.4 Delisting Priority Number: 3

NMFS concludes the Delisting and Reclassification Priority Number for this action should be 3. NMFS (55 FR 24296, June 15, 1990) provides guidance for assigning priorities for listing and recovery actions, including priorities for delisting under the ESA. A priority from 1 to 6 is assigned based on a matrix of management impact and petition status, scaled on a high-moderate-low basis.

NMFS has considered the management impact entailed by the species inclusion on the list. Under the aforementioned guidance (55 FR 24296), the:

> (M)anagement impact is the extent of protective actions, including restrictions on human activities, which must be taken to protect and recover a listed species. If the current listing is no longer accurate, continuing protective management actions could divert resources from species more in need of conservation and recovery efforts, or impose an unnecessary restriction on the public. Because the Act mandates timely response to petitions, the system also considers whether NOAA Fisheries has been petitioned to remove a species from the list…Higher priority will be given to petitioned actions than to unpetitioned actions that are classified at the same level of impact.

NMFS has received two petitions to delist this species. Thus, the priority we assigned was the higher of the two recommended given the management impact of the action.

NMFS concludes the management impact of this action will be moderate to low. This is because the eastern DPS of Steller sea lion is a marine mammal that will continue to be protected under provisions of the MMPA. The primary effect of retaining this species on the list of threatened species would be to continue the requirement that federal agencies consult, under Section 7 of the ESA, on actions that may affect this species or its critical habitat. The combination of a moderate management impact with petitioned actions results in assigning a Delisting Priority of 3 within the matrix.

6 ACKNOWLEDGEMENTS

The status review for the eastern Distinct Population Segment of Steller sea lion benefited greatly from information provided by a number of scientists. This review started as a 5-year review of status under the ESA with Sean Ledwin providing an initial draft using a standard 5-year template, working under the guidance of Susan Pultz, in the NMFS Office of Protected Resources. The species delineation evaluation was drafted independently by staff of the National Marine Mammal Lab (NMML), Alaska Fisheries Science Center (AFSC).

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Figures and Tables

Figure 1. Range and breeding rookeries of the Steller sea lion and delineation at 144°W longitude between the western and eastern distinct population stocks.

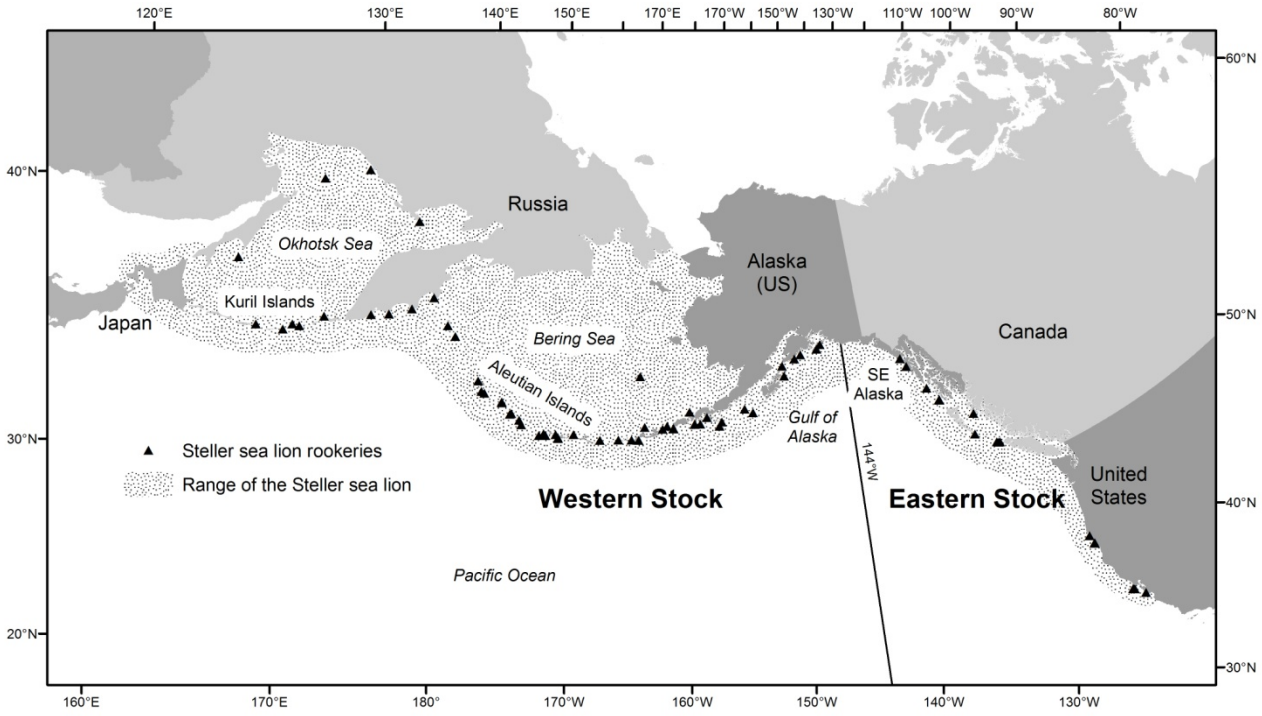


Figure 1.1. Designated Steller sea lion critical habitat east of 144°W longitude (NMFS 2008). Critical habitat areas include an aquatic zone that extends 3,000 ft seaward from the identified area as well as an air zone that extends 3,000 ft above these areas.

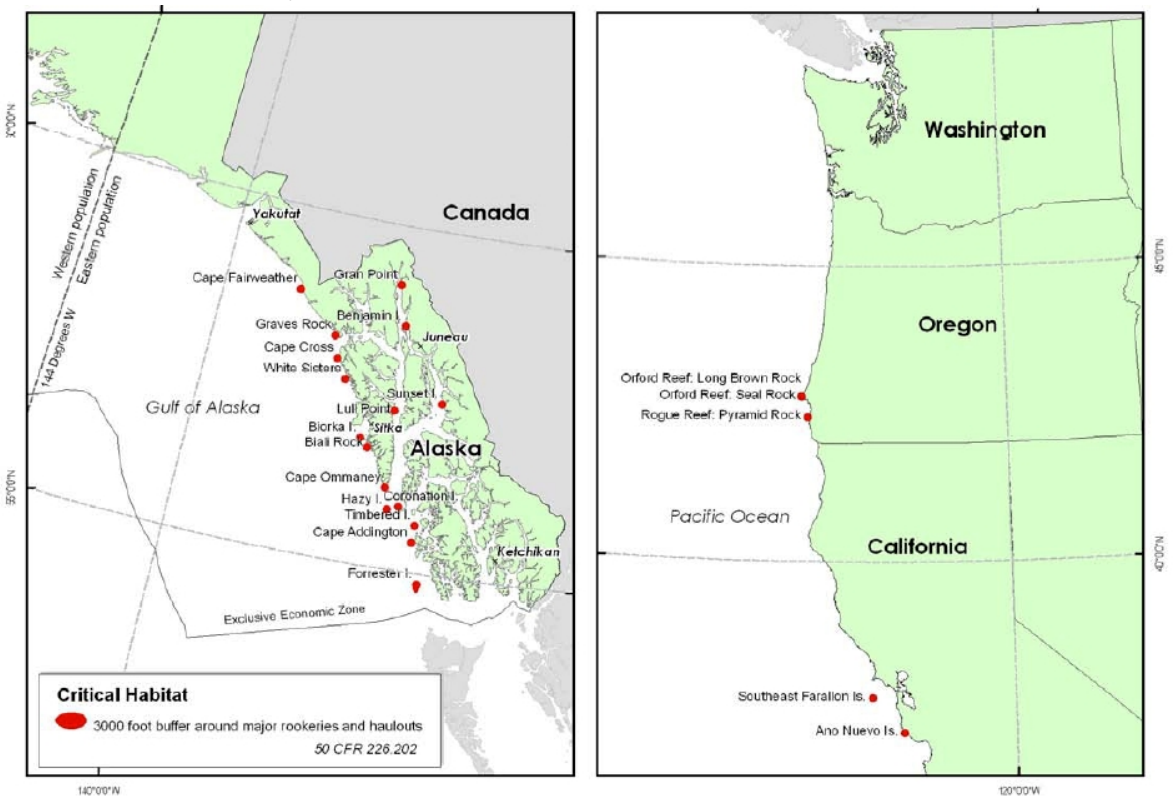


Figure 1.2. Designated Steller sea lion critical habitat west of 144°W longitude (NMFS 2008).

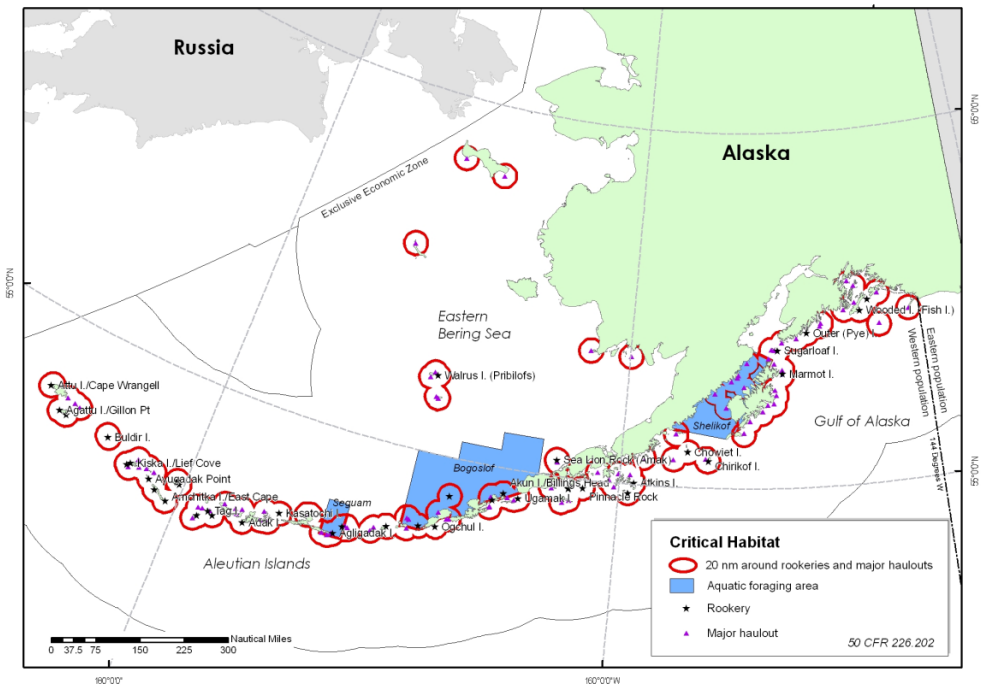


Figure 3.1. Geographic location of eastern DPS Steller sea lion rookeries (labeled) and haulouts in Alaska.

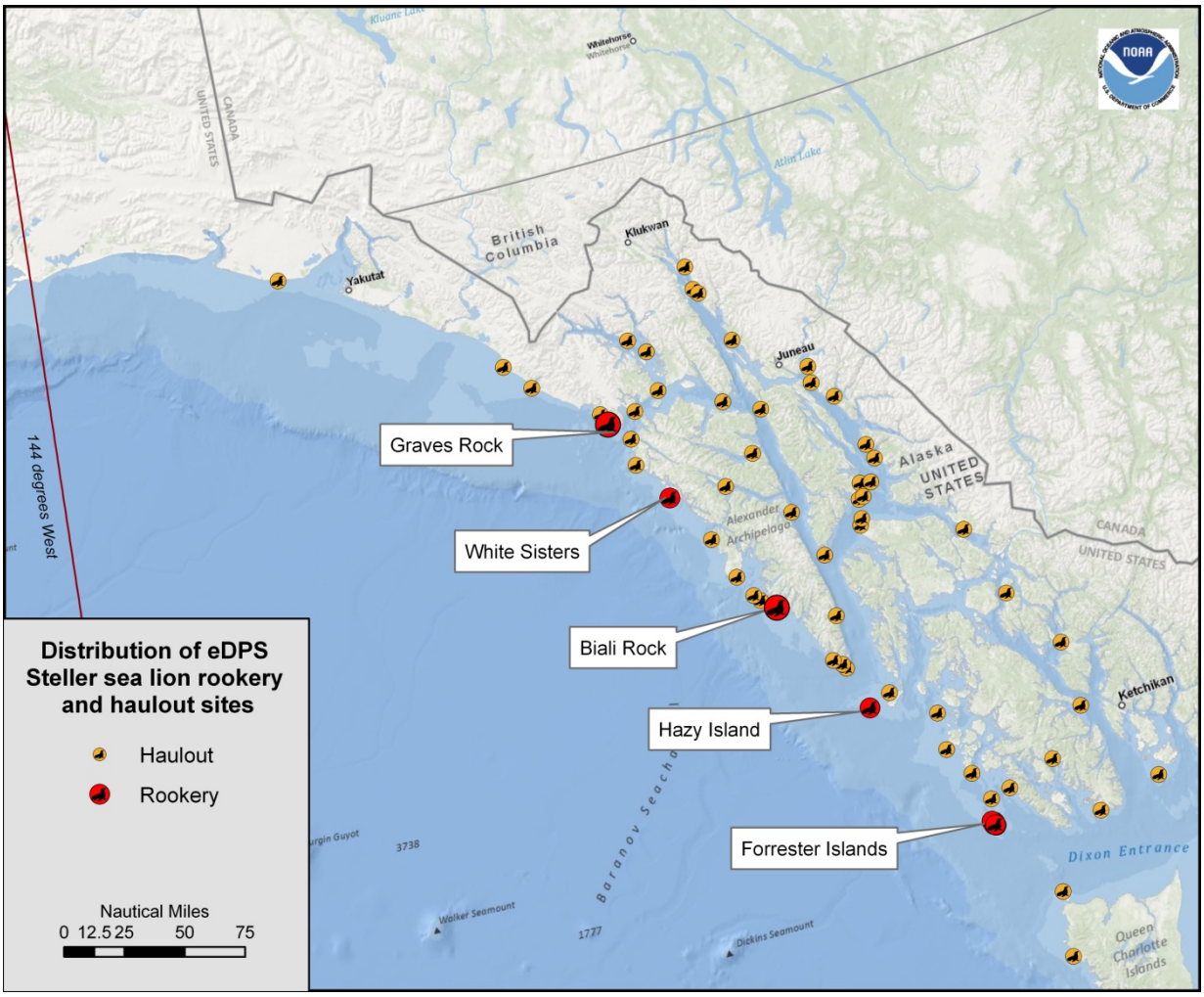


Figure 3.2. Geographic location of eastern DPS Steller sea lion rookeries (labeled) and haulouts used in British Columbia, Canada.

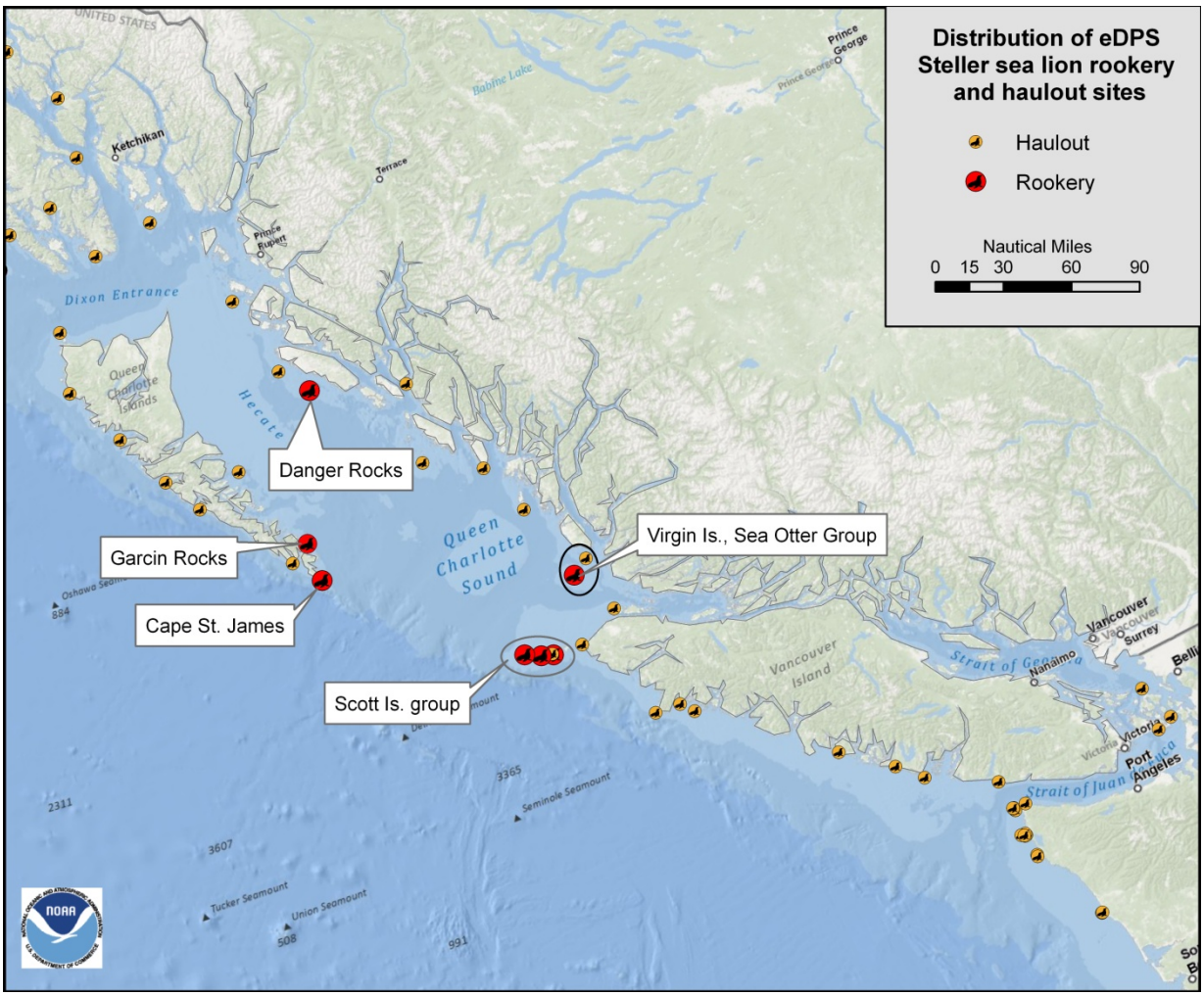


Figure 3.3. Geographic location of eastern DPS Steller sea lion rookeries (labeled) and haulouts from Washington to California.

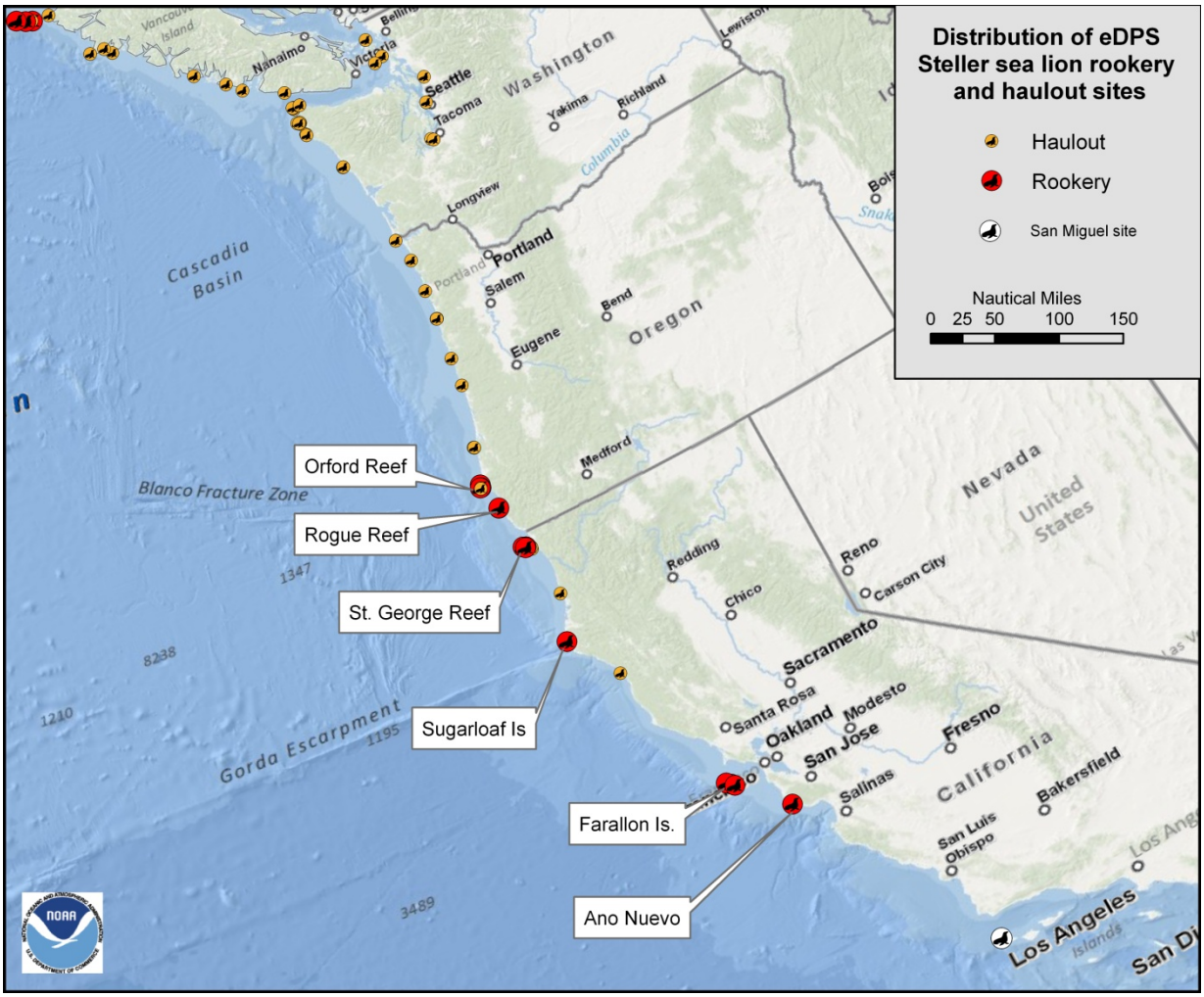


Figure 3.5.1. Counts of eastern DPS Steller sea lion adults and juveniles (non-pups) at trend sites in southeast Alaska (A), British Columbia (B), Oregon (C) and California (D), 1971-2009 (symbols), and the log-linear regression estimate (line). See Fritz and Gelatt (2011) for data references.

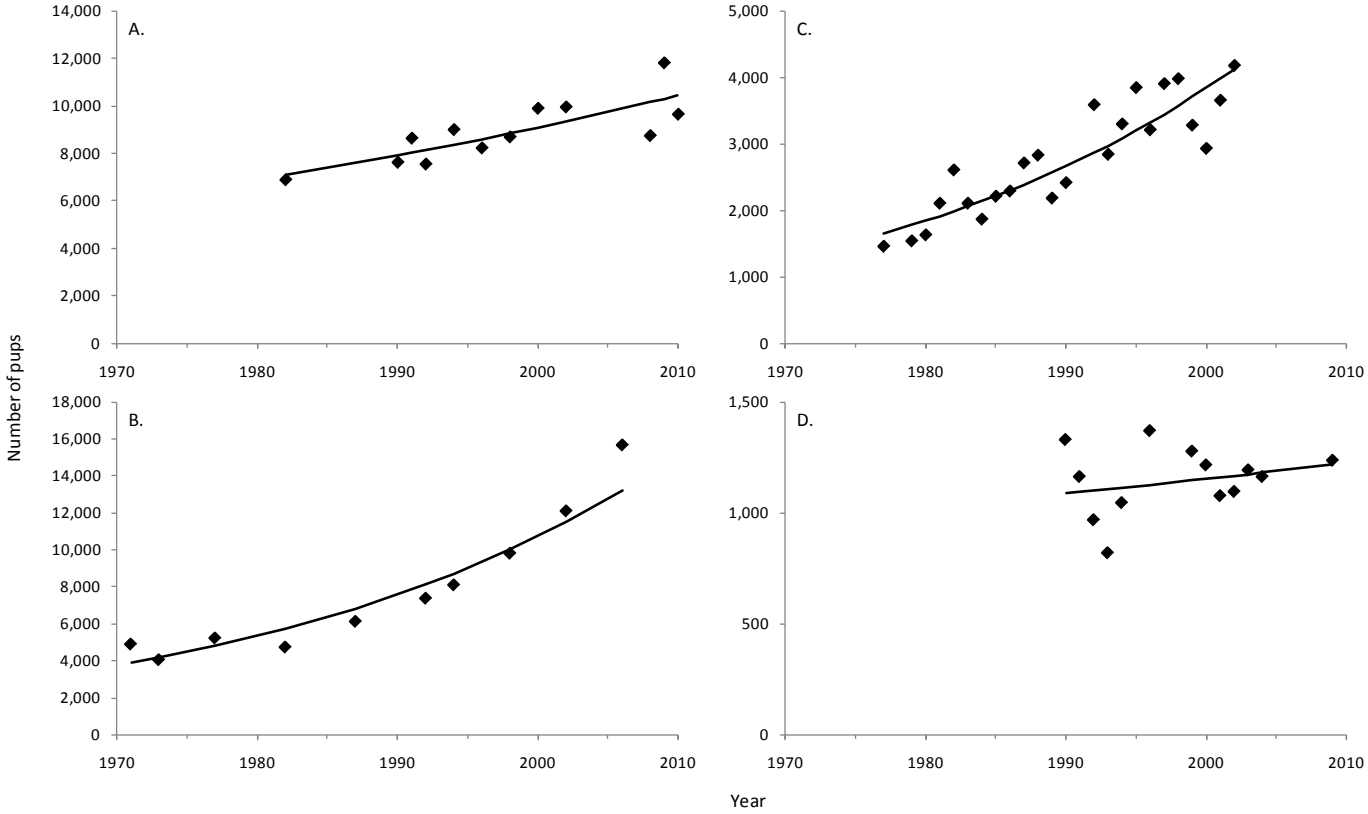


Figure 3.5.4. Counts of eastern DPS Steller sea lions from aerial surveys conducted during the breeding season in Washington State from 1989-2008. Data provided by S. Jeffries, WDFW.

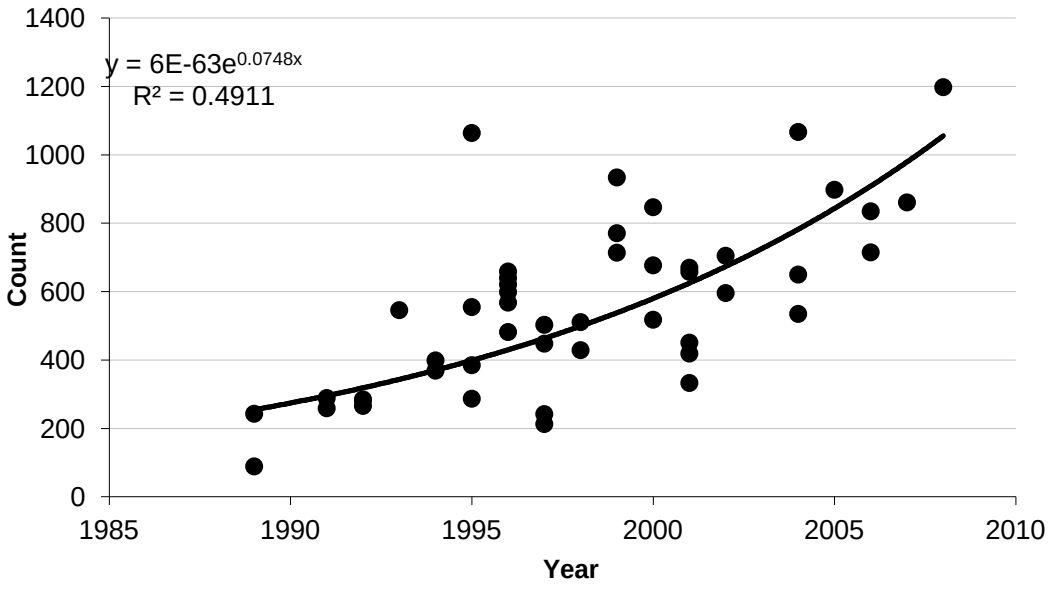


Figure 3.5.5. Counts of non-pup eastern DPS Steller sea lions ashore in Oregon, June-July, 1976-2008. Counts from 2006 and 2008 have not been finalized. Oregon Department of Fish and Wildlife, unpublished data. (ODFW and WDFW 2010: Appendix I).

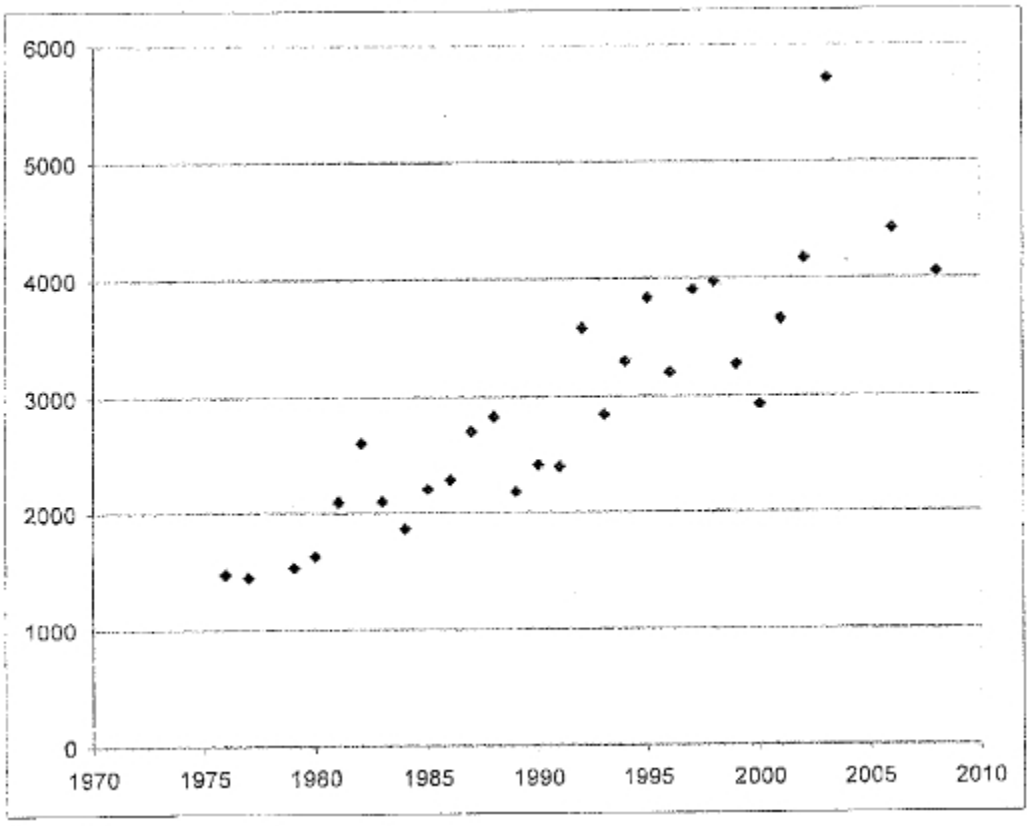
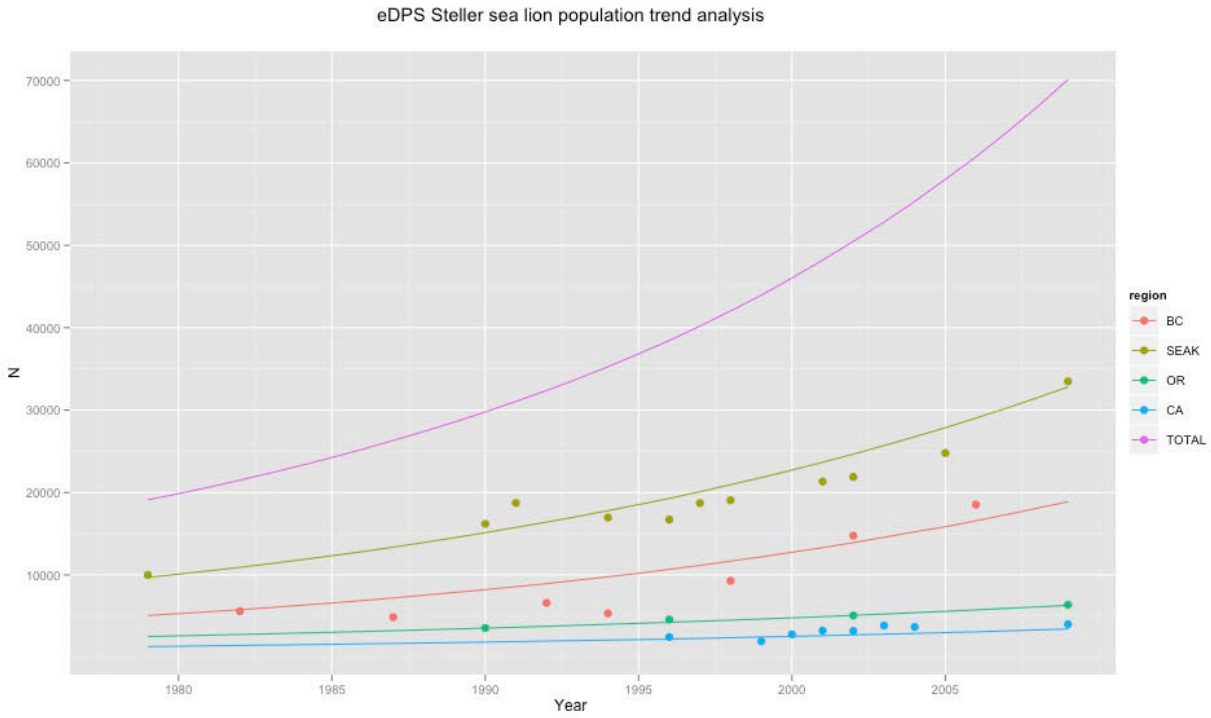


Figure 3.5.6. Analysis of population trend for the overall eastern DPS of Steller sea lions, 1979-2009 (NMML 2012).



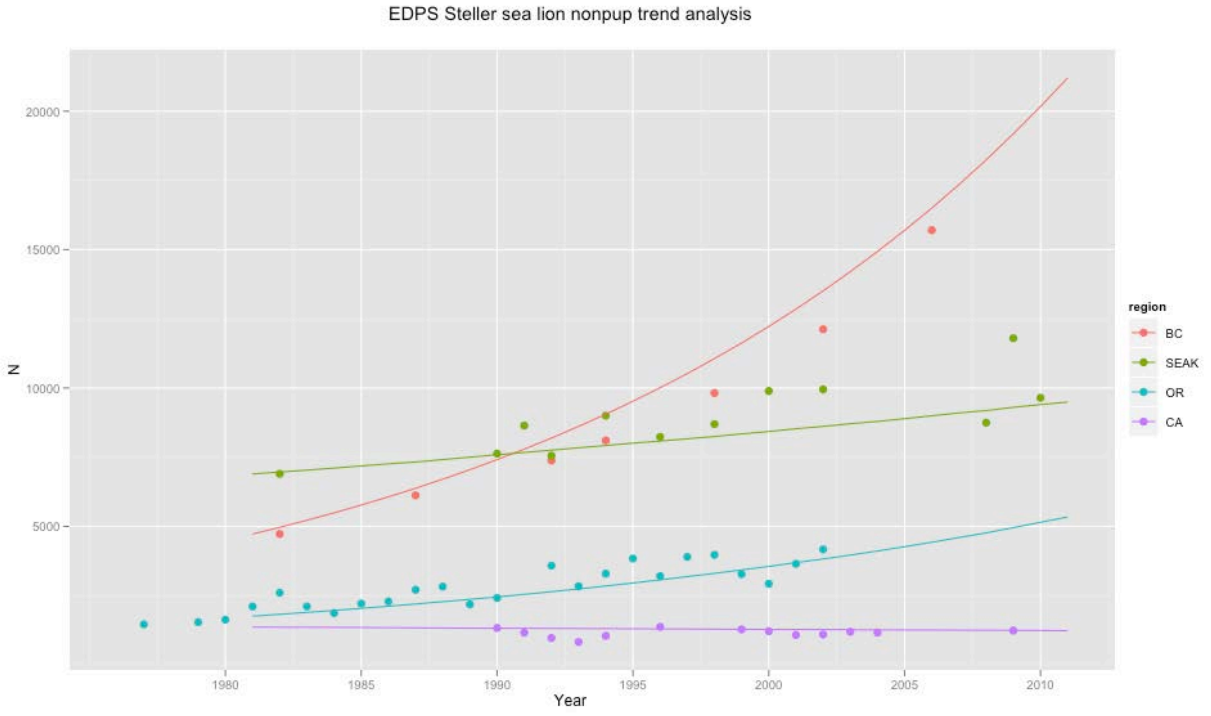


Table 3.5.2. Counts of adult and juvenile (non-pup) eastern DPS Steller sea lions observed at individual rookery sites combined in southeast Alaska during June-July aerial surveys from 1979 to 2010. Data updated from Allen and Angliss (2011; Total Counts) and Table I-6 in NMFS (2008:I-47) in which data from Sease *et al.* 2001, ADF&G and NMFS unpublished data was presented. As per Fritz and Gelatt (2011), 2010E (early) refers to the non-pup survey conducted 7 June-3 July 2010; 2010L (late) refers to the movement survey conducted 10-13 July 2010.

Year	Forrester Island	Hazy Island	White Sisters	Graves Rocks	Biali Rocks	Total Count SE AK	Total Counts at Trend Sites in SEAK
1979	3,121	893	761	-	810		
1982	3,777	1,268	934	-	722		6,898
1989	4,648	1,462	734	475	794		
1990	3,324	1,187	980	937	596		7,629
1991	3,970	1,496	975	470	494		8,621
1992	3,508	1,576	860	366	398		7,555
1994	4,010	1,615	868	733	410		9,001
1996	3,551	1,759	894	475	342		8,231
1998	3,788	1,962	858	445	476		8,693
2000	3,674	1,824	1,398	558	690		9,892
2002	3,699	2,050	1,156	1,001	626*	15,284	9,949
2005	5,557	2,293	1,078		598		
2008	2,894	1,686	1,132	1,305	408	14,344	8,748
2009	4,752	2,457	1,435	1,442	616	16,986	11,797
2010E	3,385	1,642	1,557	1,057	488	15,776	9,644
2010L	3,152	1,570	W	W	509	10,803	6,155

* New data updated or added from Table 4 of Fritz and Gelatt (2011:21).
"W" refers to a site missed because of bad weather.

Table 3.5.3. Counts of eastern DPS Steller sea lions on rookeries and haulouts in British Columbia, 1971-2010. Data from Olesiuk and Trites (2003), NMFS (2008), and Olesiuk (2008). Updated information and counts for 2008 and 2010 from P. Olesiuk, Dept. Fish. Oceans, Canada, pers. comm. to T. Gelatt, NMFS, NNML, February 28, 2012).

Year	Non-pups	Pups	Total
1971	4,653	941	5,594
1973	4,570	1,015	5,585
1977	5,219	963	6,182
1982	4,726	1,245	5,971
1987	6,122	1,084	7,206
1992	7,378	1,468	8,846
1994	8,104	1,186	9,290
1998	9,818	2,073	11,891
2002	12,122	3,281	15,403
2006	15,721	4,118	19,839
2008	15,061	4,067	19,128
2010	17,996	5,485	23,481

Table 3.5.6. Counts of eastern DPS Steller sea lion adults and juveniles (non-pups) at trend sites (those consistently surveyed) in southeast Alaska (SE AK), British Columbia (BC), Oregon (OR) and California (CA), 1971-2009. Number of trend sites follows each region name (e.g. OR-2 is 2 sites in Oregon). Table from Fritz and Gelatt (2011) with updated information for BC from P. Olesiuk pers. comm. to T. Gelatt, NMFS, NMML, February 28, 2012.

Year	SE AK-12	BC-all	OR-2	CA-3	CA-4
1971		4,653			
1973		4,570			
1974					
1977		5,219	1,461		
1979			1,542		
1980			1,632		
1981			2,105		
1982	6,898	4,726	2,604		
1983			2,106		
1984			1,867		
1985			2,210		
1986			2,289		
1987		6,122	2,709		
1988			2,825		
1989			2,183		
1990	7,629		2,414	1,329	
1991	8,641			1,163	
1992	7,555	7,378	3,581	969	
1993			2,838	821	
1994	9,001	8,104	3,293	1,046	
1995			3,837		
1996	8,231		3,205	1,369	1,870
1997			3,897		
1998	8,693	9,818	3,971		
1999			3,275	1,277	1,547
2000	9,892		2,927	1,215	1,704
2001			3,648	1,077	1,817
2002	9,949	12,122	4,169	1,096	1,684
2003				1,193	1,706
2004				1,163	1,578
2006		15,721			
2008	8,748	15,061			
2009	11,798			1,236	1,588
2010	9,644	17,996			

Table 4.3.3.1. Estimated subsistence takes of eastern DPS Steller sea lions by Alaska Natives in 6 areas of coastal Alaska between 1992-2008. Data are taken from Table 20 of Wolfe et al. (2009b:63-64). Total take values include both retrieved harvest and reported struck and lost. Data in bold are from areas within the breeding range of the eastern DPS.

Year	**SE Alaska**	North Pacific. Rim and Upper Kenai-Cook Inlet	Kodiak and S. AK Peninsula	Aleutian Islands	Pribilof Islands	Bristol Bay	Total
1992	**6.4**	41	65.2	135.2	296.8	7.8	547.4
1993	**1.1**	46	46.5	123.8	245.4	6.5	487.1
1994	**4.6**	27.7	67	122.4	193.3	1.2	416.1
1995	**0**	31.4	143.8	96.1	67.9	0	339.2
1996	**0**	16.8	65.2	57.9	46.4	0	186.2
1997	**0**	5.8	46.5	51.9	55.9	3.6	163.7
1998	**7.6**	28.5	27	37	78.1	0	178.2
2000	**2.3**	16.7	32.3	76	43.3	0	170.7
2001	**0**	16	46.6	97.7	38	0	198.4
2002	**7.0**	5.5	24.2	105.1	43	0	184.7
2003	**6.9**	24.7	41	107	32	0	211.5
2004	**11.8**	53.9	20.9	96	32	1.2	215.7
2005	**19***	49.2	29.3	88.3	32	0	217.8
2006	**12.6**	25	25.5	82.8	40	0	186
2007	**6.1***	57.8	29	76	48	0	217
2008	**9.6**	24.6	27.4	48.4	36	0	146
Mean estimated take							
1992-98	**2.8**						331.1
1998-2008	**8.4**						194.2

*all struck and lost

Table 4.3.3.2. MMPA List of Fisheries classifications for State-managed fisheries within the breeding range of the eastern DPS Steller sea lions, marine mammal species potentially affected, and stock/species driving the classification (adapted from NMFS List of Fisheries http://www.nmfs.noaa.gov/pr/interactions/lof/).

Fishery	***Category***	***Marine mammal species or stocks killed or injured***	***Basis (stock driving the classification)***
AK Southeast salmon drift gillnet	II	Dall's porpoise, AK Harbor porpoise, Southeast AK Harbor seal, Southeast AK Humpback whale, Central North Pacific Pacific white-sided dolphin, North Pacific Steller sea lion, Eastern U.S.	Humpback whale, Central North Pacific
AK Yakutat salmon set gillnet	II	Gray whale, Eastern North Pacific Harbor seal, Southeast AK Humpback whale, Central North Pacific (Southeast AK)	Harbor porpoise, Southeast AK
AK salmon troll	III	Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]
AK Gulf of Alaska sablefish longline	III	Sperm whale, North Pacific Steller sea lion, Eastern U.S.	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]
AK State-managed waters longline/setline (including sablefish, rockfish, lingcod, and miscellaneous finfish)l	III	None documented[2]	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]
AK commercial passenger fishing vessel	III	Killer whale, stock unknown Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None [total annual mortality and serious injury is ≤ 1 % of the PBR level]

[2] This fishery is included here on the basis of analogy with the federally managed Gulf of Alaska Sablefish longline fishery, which has had reported serious injury/mortalities of EDPS Steller sea lions. Although no such interactions have been reported in the State-managed fishery in State of Alaska waters, the two fisheries operate in similar means (e.g., time, space, and gear), and the State fishery occurs well within the range of seasonal concentrations of foraging EDPS sea lions, thus it is reasonable to consider that such interactions may occur.

APPENDICES

APPENDIX 1A. DeMaster, D., 2011. Memo from AFSC to AKR Transmitting the AFSC's "Review and Determination of Discreteness and Significance of the Steller Sea Lion Eastern Distinct Population Segment"

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

ALASKA FISHERIES SCIENCE CENTER
7600 Sand Point Way NE, Bin C15700
Seattle, Washington 98115-0070

6 May 2011

MEMORANDUM FOR: James W. Balsiger, Ph.D.
Regional Administrator

FROM: Douglas DeMaster, Ph.D.
Science and Research Director

SUBJECT: AFSC evaluation of eastern distinct population segment of Steller Sea Lions

On 19 April 2011, the Alaska Region requested assistance from the Alaska Fisheries Science Center (AFSC) on an issue related to a status review for the eastern distinct population segment (EDPS) of Steller sea lions. We were asked to evaluate whether or not the current designation of the EDPS comprises a distinct population segment (DPS) as defined under the Endangered Species Act (ESA).

The AFSC has completed a thorough review of the best available scientific information and has determined that the EDPS of Steller sea lions, as currently designated under the ESA, does satisfy the first condition of the policy for discreteness (61 FR 4722). The EDPS of Steller sea lions comprise a distinct population segment as defined under the ESA and the EDPS is significant to the taxon. This conclusion is based on an extensive body of research that includes sea lion population genetics, ecology, behavior, and details regarding the physical and physiological characteristics of the species. The attached document summarizes the information considered and the conclusions drawn by scientists at the AFSC; the document was peer-reviewed by several external experts. The reviewers endorsed the conclusions drawn by AFSC scientists and the reviewers' comments and suggestions were incorporated into the final document.

APPENDIX 1B. Alaska Fisheries Science Center, National Marine Fisheries Service/NOAA, 2011. Review and Determination of Discreteness and Significance of the Steller Sea Lion Eastern Distinct Population Segment

Review and Determination of Discreteness and Significance of the Steller Sea Lion Eastern Distinct Population Segment

Alaska Fisheries Science Center
National Marine Fisheries Service/NOAA
Seattle, Washington

May 6, 2011

1 Introduction and History of Relevant Decisions

Steller sea lions were first listed as a single threatened species throughout their range under the Endangered Species Act (ESA, or "the Act") in 1990 (55 FR 12645, April 5, 1990). At that time there was no subpopulation distinction identified. In September, 1994 Tom Loughlin presented a paper at the *Workshop on the Analysis of Genetic Data to Address Problems of Stock Identity as related to Marine Mammals*, held at the National Marine Fisheries Service (NMFS) Southwest Fisheries Science Center in San Diego, California. In that presentation and in the subsequent publication Loughlin (1997) concluded, based on an evaluation of distribution, population response, phenotypic, and genotypic data, that Steller sea lions should be managed as two discrete populations, with the separation point at about 144º west longitude. Loughlin (1997) used the phylogeographic method (Dizon et al. 1992) and relied heavily on results from mitochondrial DNA (mtDNA) analysis of samples from Russia, the eastern Aleutian Islands, the Gulf of Alaska, and Southeast Alaska (Bickham et al. 1996) to argue for two distinct population segments (Loughlin 1997).

In November 1994, NMFS re-convened the Steller Sea Lion Recovery Team (the Team) to consider the appropriate status for the species, and the Team recommended that "NMFS list the Steller lion as two distinct population segments, split to the east and west of 144ºW longitude." A Federal Register notice (61 FR 4722) jointly produced by the U.S. Fish and Wildlife Service and NMFS in February 1996 noted the adoption of a policy to "clarify their interpretation of the phrase 'distinct population segment of any species of vertebrate fish or wildlife' for the purpose of listing". These were the criteria used by NMFS in the status review for the 1997 listing following the recommendation of the Team "that the western population segment be listed as endangered and the eastern population segment remain listed as threatened" (62 FR 24346, May 5, 1997). The agency used all of the available information involving diverging population trends, phenotypic differences, and primarily the deep division in the mtDNA clades to justify the decision. The eastern distinct population segment (DPS) includes sea lions born on rookeries from central California north through Southeast Alaska; the western DPS includes those animals born on rookeries from Prince William Sound westward (Bickham et al. 1996; Loughlin 1997).

2 Elements of the 1996 Distinct Population Segment (DPS) Policy

The 1996 policy (61 FR 47222) states that, "The authority to list a 'species' as endangered or threatened is thus not restricted to species as recognized in formal taxonomic terms, but extends to subspecies, and for vertebrate taxa, to distinct population segments (DPSs)". There are three fundamental elements listed in the 1996 policy that must be "considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act". These same elements must also be considered in the case of a delisting. They are as follows:

- Discreteness of the population segment in relation to the remainder of the species to which it belongs;
- The significance of the population segment to the species to which it belongs; and
- The population segment's conservation status in relation to the Act's standards for listing (i.e., is the population segment, when treated as if it were a species, endangered or threatened?).

2.1 Discreteness of the population segment

The 1996 policy (61 FR 47222) states that a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following two conditions which have here been phrased as questions.

2.1.1 Is the currently identified Eastern DPS of Steller sea lions markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors? Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

The present range of Steller sea lions extends around the North Pacific Ocean rim from Northern Japan, the Kuril Islands and the Sea of Okhotsk, through the Aleutian Islands and Bering Sea, along Alaska's southern coast, and south to California (Kenyon and Rice 1961; Loughlin et al. 1984, 1992; Burkanov and Loughlin 2005). The regulatory division between the eastern and western DPSs was chosen as Cape Suckling (144º west longitude) in the northeast Gulf of Alaska using the phylogeographic method suggested by Dizon et al. (1992) as applied by Loughlin (1997). This approach combined the available information on Steller sea lion distribution, population response, phenotype, and genotype and argued that the population of Steller sea lions in the United States qualified under the Dizon et al. (1992) definition of a Category II population. A Category II population is characterized by a "discontinuous genetic diversity pattern between groups of closely related genome assemblages existing sympatrically or parapatrically – that is, great genetic divergence accompanied by weak geographic partitioning (Dizon et al. 1992)".

Loughlin (1997) cited population demography and animal movement data but focused a heavy reliance on a mitochondrial DNA study by Bickham et al (1996) to justify the Category II

ranking. Bickham et al. (1996) used mitochondrial DNA from 224 sea lions sampled between the Commander Islands and Oregon to reveal a broad scale of geographic structuring present within the population and suggested that the overall population be divided into eastern and western stocks or DPSs. Loughlin (1997) also presented data on morphological differences found by Merrick et al. (1995) who noted a significant difference of mean pup mass existed at rookeries between pups from the Aleutian Islands and those in the Gulf of Alaska and Southeast Alaska, with pups from Oregon being the lightest. Since publication of Loughlin (1997) a significant amount of work has been conducted which reveals additional information on the basic ecology of the species. Relevant information is summarized below.

Population Trends - Southeast Alaska and British Columbia

In the northern portion of the range of the eastern DPS of Steller sea lion (southeast Alaska and British Columbia), Steller sea lion populations have increased at rates exceeding 3% per year since the 1970s and have expanded their use of terrestrial habitats northward (Pitcher et al. 2007; Olesiuk 2008; Fisheries and Oceans Canada 2010; NMML, unpublished). Pup production increased at a rate of 3.6% per year between 1979 (N=2,219) and 2009 (N=7,442) in southeast AK, and at a rate of 3.9% per year between 1971 (N=941) and 2006 (N=4,118) in British Columbia. Counts of adult and juvenile sea lions (non-pups) have also increased in both regions during the last 30 years, almost doubling between 1982 (N=6,898) and 2009 (N=11,798) in southeast Alaska and more than tripling between 1971 (N=4,617) and 2006 (N=15,700) in British Columbia.

In the 1970s, there was only a single functional rookery in southeast Alaska, the Forrester Complex, which produced 2,187 pups in 1979. During the 1980s, however, a new rookery had become established on Hazy Island (638 pups counted in 1990), and between 1990 and 2005, three new rookeries became established in the northern half of southeast Alaska (White Sisters, Graves Rock and Biali Rock). By 2009, pup production at these four new rookeries totaled 3,407 where 30 years previously only 32 were counted, an increase of over 100-fold. At the Forrester Complex, pup production also increased, but by less than 2-fold during this same time period (N=4,036 in 2009).

In British Columbia, the pattern of increase in pup production at rookeries has been different than in southeast Alaska, with the establishment of a single dominant rookery. In the 1970s, there were five small rookeries on Maggot, Sartine and Triangle Islands (together they form the Scott Islands), plus North Danger Rocks and Cape St. James that each produced less than 350 pups. By 2006, production at one rookery, Triangle Island, had increased over 13-fold (from 181 in 1971 to 2,674 in 2006), while at all of the other four rookeries combined, production increased by only a factor of 1.25 (from 760 to 1,366 pups). In addition, there is evidence from the 2006 survey that a new rookery may be forming on Virgin Rocks, where 55 pups were counted.

Population Trends - Washington, Oregon and California

Although Steller sea lions haulout throughout their eastern DPS range from central California through southeast Alaska, there are no breeding rookeries along a more than 600 mile stretch of the Pacific coastline between the northern end of Vancouver Island and Orford Reef in Oregon. Because there are no rookeries in Washington State, the southern portion of the eastern DPS range has primarily been monitored in Oregon and California. Breeding populations in both

states have increased significantly since the 1970s. However, a rookery at the southern end of the range in California (on San Miguel Island in the Channel Islands) was abandoned in the early 1980s (Stewart et al. 1993). Counts of Steller sea lions in the Channel Islands peaked in the late 1930s and declined considerably in the 1940s and 1950s (Pitcher et al. 2007). Currently, the southernmost rookery is on Año Nuevo (37° 6'N), about 230 miles north of San Miguel Island.

The earliest reliable pup counts in Oregon were conducted in 1990 at both rookeries, Rogue and Orford Reefs (N=790), and pup production increased at 3% per year through 2009 (N=1,418) (NMFS 2008; NMML unpublished). In addition, over the 25-year period from 1977 to 2002, non-pup counts at the two Oregon rookeries increased at 2.5% per year (Pitcher et al. 2007). At the three rookeries in California (Año Nuevo, Sugarloaf/Cape Mendocino, and St. George Reef), pup production increased at 5.3% per year between 1996 (N=546) and 2009 (N=891) while non-pup counts at all sites in California have been stable (no discernible trend) over this same period (NMFS 2008; NMML, unpublished). However, sea lion abundance in central California (Año Nuevo and the Farallon Islands) in 2002 was only about 20% of that recorded in the period from the 1920s through the 1960s (Pitcher et al. 2007).

Pup production trends since the early 1990s have been different at each of the California rookeries. Annual pup production has been relatively stable on Año Nuevo between 1993 and 2009 (average of 225; minimum of 152 in 1999 to a maximum of 244 in 1994; 2009 pup count was 214). The Farallon Islands does not produce enough pups to be considered a rookery (<50), but the number counted there has increased from a range of 2-10 from 1990 through 2002 to a high of 24 in 2009. To the north, pup production between 1996 and 2009 has more than doubled at Sugarloaf/Cape Mendocino (from 62 to 161) and at St. George (from 243 to 492).

Population Trends - Eastern DPS Overall

Pitcher et al. (2007) estimated that the overall abundance of the eastern DPS of Steller sea lion increased at a rate of 3.1% per year for the 25-year period between 1977 and 2002. Between 2002 and 2009, NMFS and Fisheries and Oceans Canada conducted additional surveys. Adding these data to Pitcher's time series improves the annual rate of increase for the period 1977 through 2009 to 4.0% (NMML, unpublished; Olesiuk 2008). Most of the overall improvement is due to increases in the northern portion of the range in southeast Alaska and British Columbia, but the smaller population in the south (Washington, Oregon and California) has significantly increased in abundance as well.

Pitcher et al. (2007) described the northward shift in the breeding population of Steller sea lions within the eastern DPS that has occurred over the last 80 years. This shift began at the southern end of the range in the 1930s with the decline of the southern California rookery on San Miguel Island and continued in the 1960s and 1970s when the central California population declined (Pitcher et al. 2007). At the northern end of the range, Steller sea lions established rookeries in southeast Alaska on Forrester Island in the 1950s, Hazy Island in the 1980s, and on White Sisters, Biali Rock and Graves Rock in the 1990s. In the 1920s, the center of the breeding population was at approximately 46°N (Washington-Oregon border), but by 2002, it had moved northward over 400 miles to the central British Columbia coast. Over the last 13 years (1996-2009), the regional distribution of pup production within the eastern DPS has changed only slightly: in 1996, 79% of all eastern DPS pups were born on northern rookeries in southeast

Alaska and British Columbia, while the remaining 21% were born on southern rookeries in Oregon and California; in 2009, northern rookeries produced 83% and the southern rookeries 17%. Consequently, it appears that most of the northern shift in the distribution of pup production within the eastern DPS occurred during the period from the 1930s through the early 1990s. Since the mid-1990s, pup production in both the northern and southern portions of the eastern DPS has increased significantly.

Physical and Physiological Factors

At least two studies to date have examined Steller sea lion cranial morphology to explore possible phenotypic differences between the western and eastern DPS. Brunner (2002) examined 104 Steller sea lion specimens from Alaska, California, Japan and Russia and reported that animals in Alaska from the eastern and western DPS were morphometrically similar. However, Philips et al. (2009) conducted a separate analysis of 127 skulls using identical measurements as that of Brunner (2002). Their results indicated a notable difference in skull morphology of both sexes between the two stocks (Phillips et al. 2009*a*). It was suggested that the difference in results obtained by Brunner (2002) and Phillips et al. (2009*a*) was related to differences in sampling distributions and frequencies. Furthermore, Phillips et al. (2009*a*) argued that their work, when combined with existing genetic evidence and population trajectory data, was sufficient to warrant a subspecies ranking for the eastern and western DPSs and recommended that the currently designated western and Asian stocks (wDPS) should be recognized as *Eumetopias jubatus jubatus*, while the eastern stock (eDPS) should be designated *Eumetopias jubatus monteriensis*. This subspecies ranking for Steller sea lions is currently recognized by the Society for Marine Mammalogy on their list of Marine Mammal Species and Subspecies (www.marinemammalscience.org<http://www.marinemammalscience.org>)

Variation in morphometric and physiological measurements has been found among sea lions across their range, with consistent notable differences between locations in the western and eastern DPS areas. Merrick et al. (1995) found that during 1987-1994 pups were lighter at eDPS rookeries in Oregon and Southeast Alaska than were pups at wDPS rookeries in the Gulf of Alaska and Aleutian Islands, and Brandon et al. (2005) found faster growth rates of pups in the Aleutian Islands and western Gulf of Alaska (wDPS) than of pups in Southeast Alaska (eDPS) during 1990-1997. Juvenile Steller sea lions up to two years-old captured in the Aleutian Islands and Gulf of Alaska grew faster (Fadely et al. 2004; 2000-2003 study period) and were larger than juveniles captured in Southeast Alaska (King et al. 2007; 2001-2005 study period). Similarly, Richmond et al. (2005) showed that hematology and erythropoietin values differed significantly between sea lions sampled in Prince William Sound and those sampled in Southeast Alaska. Myers et al. (2009) measured serum cortisol in samples from over 656 sea lions from the western DPS (Russia and southwest Alaska), and 285 sea lions from eastern DPS (Southeast Alaska) and also found a significant difference between the areas.

Ecological or Behavioral Factors - Sea Lion Movement

Satellite telemetry and resightings of branded sea lions offer the greatest amount of information on the behavior and an interpretation of the age and sex-specific movements within and out of the currently designated eastern DPS. Observations of animals (primarily young males) marked in one DPS but seen in another have been reported.

An examination of movements from 1975-1995 by the Alaska Dept. of Fish and Game (L. Jemison, pers. comm.) revealed that sea lions branded as pups on their natal rookeries dispersed widely but there was little interchange between eastern and western DPSs (Raum-Suryan et al. 2002). Additional indications of post-weaning movements were detected through deployment of satellite-linked transmitters during 1998-2001 (Raum-Suryan et al. 2004); of 103 instrument deployments (74 eastern DPS / 29 western DPS) a 19-month male moved from Benjamin Island (eastern DPS) to sites in the western DPS and a 9-month old male tagged near Kodiak Island was tracked into the eastern DPS area until the telemeter failed after 2 months. However, none of those published studies provided indication of permanent trans-boundary movements. In more recent research, of nearly 2,000 pups marked at eastern DPS rookeries from 2001-2005, 107 individuals have traveled to the western DPS; only 2 of the animals traveling west were females (ADF&G, unpublished data). One female returned to her natal rookery at breeding age and the other has not been seen since traveling west at one year of age. Thirteen males (1.9%) that were marked as pups in the eastern DPS have been seen in the western DPS at older ages (7-9 years; note that not all marked cohorts have yet reached 7 years of age). During the breeding season in 2010, ten of those had returned to an eastern rookery, one was sighted at Cape St. Elias (near the boundary between eastern and western DPSs), one remained in the western DPS, and one was never observed.

Of the nearly 800 animals branded at the Forrester Island rookery (which includes Lowrie Island) in 1994-1995, 2.8% of the males traveled west of Cape Suckling, but no females traveled west. Of the 12 traveling males, 10 later returned to rookeries in the eastern DPS during the breeding season and most (9) were territorial bulls at either the Forrester Islands or Hazy Islands rookeries. Seventy-seven animals marked at western rookeries (in Prince William Sound and near Kodiak Island; N = 1241) from 2000 – 2008 have traveled to the eastern DPS; 43 were males and 34 were females. Of the females, all but one was seen in northern Southeast Alaska. Most (89%) of the 18 reproductive-age females were resighted at either the Graves Rock or the White Sisters rookery during the breeding season. At least seven western DPS females are known to have pupped at eastern DPS rookeries (five at Graves Rock, two at White Sisters), based on resightings of branded animals. Six of the seven females that pupped at eastern DPS rookeries have thus far only been resighted in the eastern DPS. Of the males marked at western rookeries, four individuals (1.1%) traveled to the eastern DPS at older ages (7-10 years). All four were seen at Graves Rock rookery during the breeding season and one was considered a territorial bull, hauled out among adult females.

In summary, observations of branded sea lions in both DPS's have indicated that eastern DPS males travel west more frequently than eastern DPS females, and in fact there are very few sightings of an eastern DPS female in the western DPS. Conversely, similar numbers of western DPS males and females travel east. Some western DPS females have been seen within the eastern DPS annually since a young age, eventually pupping there, suggesting a permanent emigration although one female following this pattern later returned to the west and pupped at a western rookery. It appears that most males return to their natal DPS as they near breeding age.

Ecological or Behavioral Factors - At-Sea and Dive Behavior

Diving behavior of Steller sea lions is strongly influenced by time-of-day, age, gender, and season (Merrick and Loughlin 1997; Loughlin et al. 2003; Fadely et al. 2005; Pitcher et al. 2005;

Rehberg and Burns 2008; Thomton et al. 2008), but several studies have compared diving and at-sea trip behavior between western and eastern DPS populations. Juvenile Steller sea lions in Southeast Alaska (eastern DPS) had significantly greater dive depths, dive durations, and dive rates than did juveniles from the western DPS (eastern Aleutians-Prince William Sound), but sea lions from the western DPS spent more time at sea (Pitcher et al. 2005). Pitcher et al. (2005) could not conclude that sea lions from one population were 'working harder' than the other because differences were relatively small and likely due to variations in bathymetry and prey distribution. Similarly, Loughlin et al. (2003) found that Washington yearlings (eastern DPS) dove deeper and longer than yearlings in Alaska (western DPS: central Aleutians – eastern Gulf of Alaska), and also related this finding to differences in local prey habitat. Round-trip distances of western DPS (eastern Aleutian Islands-Prince William Sound) juveniles were greater than eastern DPS (Southeast Alaska) juveniles (Raum-Suryan et al. 2004), and trip durations of juveniles from the eastern Aleutian Islands and central Gulf of Alaska (western DPS) were greater than trip durations of juveniles in Southeast Alaska (eastern DPS; Call et al. 2007). Differences in trip distance and durations between western and eastern DPSs are possibly explained by juveniles in the western DPS weaning or supplementing their diet at younger ages than occurs in the eastern DPS (Raum-Suryan et al. 2004; Pitcher et al. 2005; Call et al. 2007), or indicates differences in prey abundance, distribution or composition (Call et al. 2007) such that western DPS juveniles had more difficulty obtaining prey than juveniles in Southeast Alaska (Raum-Suryan et al. 2004).

Rehberg et al. (2009) compared breeding season dive behavior of 11 adult females from Southeast Alaska with four measured in the eastern Aleutian Islands-central Gulf of Alaska by Merrick and Loughlin (1997) and found similar mean dive depths, dive durations, dive rates, and proportion of time at-sea between the two populations. Adult females from both populations had similar mean maximum trip distances, but eastern DPS females had much smaller home ranges suggesting that eastern DPS females were accessing concentrated prey features through directed movements, whereas western DPS female behavior was indicative of foraging on more dispersed prey resources through broader exploration movements (Rehberg et al. 2009). Davis et al. (2006) found that during the first 1-1.5 months postpartum, adult females in Southeast Alaska had longer foraging trip durations than females from Chirikof (central Gulf of Alaska) and Seguam Island (central Aleutian Islands), and suggested there was evidence of a cline of decreasing trip durations from east to west. When all studies of maternal foraging trip duration using either visual, radio-tag, or satellite telemetry data (Higgins et al. 1988; Merrick and Loughlin 1997; Trites and Porter 2002; Milette and Trites 2003; Davis et al. 2006; Maniscalco et al. 2006; Rehberg et al. 2009) are considered however, a cline is not readily apparent over a broad range from the central Aleutian Islands through Southeast Alaska, and the trip duration and proportion of time at sea measured at Chirikof/Seguam Islands stand out as being much lower than measured at other sites, perhaps in part due to the measurement period of that study relative to others, as maternal trip duration increases with pup age (Higgins et al. 1988; Milette and Trites 2003; Maniscalco et al. 2006). Too few studies of non-breeding season adult female behaviors have been conducted to provide meaningful western/eastern DPS comparisons.

Sea lion diving and foraging behavior thus likely reflects phenological and diurnal cycles of sea lion prey, sea lion dive ontogeny, and sex-specific life history constraints in addition to regional differences in prey composition, abundance and distribution. However as pointed out by Pitcher

et al. (2005), it is not possible to conclude whether groups of animals from any particular area may be working harder than others to obtain prey because of uncertainty of the relationships among dive and travel behaviors and how that ultimately relates to foraging success.

Genetic Factors

There has been an extensive amount of work conducted on the population genetics of Steller sea lions since the last status review and the Bickham et al. (1996) paper. Here we note some of the relevant studies and their results as they pertain to the criteria of quantitative measures of genetic or morphological discontinuity that might provide evidence of the separation of a population segment.

In 1998 Bickham et al. investigated the geographic variation in the mitochondrial DNA (mtDNA) of Steller sea lions in Russia with an analysis of over 1,200 animals and re-confirmed evidence for an eastern stock that was later recognized as the eastern DPS. In addition, they proposed the possibility of an Asian stock delineated just west of the Commander Islands. The most differentiated lineages of Steller sea lions were still found between the western part of the range (Russia to the eastern Gulf of Alaska) and eastern locations (Southeast Alaska and Oregon) indicating restricted gene flow between the two populations. This three stock hypothesis was again confirmed in a study by Baker et al. (2005) who analyzed sequence variability at a segment of the mtDNA control region from 1,568 individuals representing every significant rookery range-wide.

An additional study by Bickham et al. (1998b) analyzed samples of sea lions collected in the Gulf of Alaska in 1976-1978 and compared the results with samples collected in the 1990's following the steepest population decline. The authors found that genetic diversity and haplotype frequency in sea lions sampled in the Gulf of Alaska, an area in which abundance had declined, had not changed significantly between the two time periods. .

Harlin-Cognato et al. (2006) used mtDNA to explore the phylogenetic relationships of sea lions in the context of Plio-Plestocene insular refugia. The authors suggested that the current genetic structure of sea lions is the result of Pleistocene glacial geology which influenced the availability of suitable habitat. The phylogeographic break observed for Steller sea lions is geographically analogous to breaks for several other species, including other marine mammals.

O'Corry-Crowe et al. (2006) examined a longer segment of the mtDNA than had previously been completed on a large sample (n = 1,654) of sea lions from across Alaska and also confirmed a high level of phylogeographic differentiation between the populations in southeastern Alaska and western Alaska. The authors went further to examine fine-scale dispersal patterns and found distinct differences between rookeries east and west of Samalga pass within the western DPS that they attributed to substantial female-mediated philopatry. The authors went further and specifically spoke to the policy addressed here stating that, "The phylogeographic partitioning between eastern and western mtDNA lineages reported here agrees with earlier studies (e.g., Bickham et al. 1996) and supports the current DPS designations within Alaska" (O'Corry-Crowe et al. 2006).

Two genetic studies have used the same pup tissue samples to conduct microsatellite analysis of the nuclear genome to address the question of a clear stock delineation. This method accounts for the male contribution rather than just focusing on the female contribution as with mtDNA. Trujillo et al. (2004) genotyped 208 individuals using 6 microsatellite loci and found that the population separation apparent from mtDNA was not clearly defined when males were taken into account. The authors postulated that the difference in population genetic structure described by microsatellites and mtDNA may be explained by high male dispersal and female philopatry, or insufficient isolation time for nuclear loci divergence. Hoffman et al. (2006) followed up on the research by Trujillo et al. (2004) and Baker et al. (2005) by genotyping 709 individuals from across the species range at 13 microsatellite loci. The authors found corroborating support for a significant divergence of the eastern and western populations using microsatellites, contrary to the findings of Trujillo et al. (2004). The contrasting results of these two studies were most likely due to insufficient genetic resolution provided by inclusion of fewer samples, and more importantly, fewer microsatellite markers by Trujillo et al. (2004).

Hoffman et al. (2009) analyzed amplified fragment length polymorphism (AFLP) of 285 sea lions at rookeries throughout their range to provide an alternative nuclear DNA perspective on population structure. Basing their work on previously collected samples, the authors observed that the eastern stock has the greatest mtDNA diversity but the least nuclear diversity (from microsatellites and AFLPs). The AFLP findings concurred with previous studies (Bickham et al. 1996; 1998; Ream 2002; Baker et. al. 2005; Hoffman et al. 2006) that showed differentiation between the eastern and western populations.

Recently Phillips et al. (2009*b*) examined the substitution patterns, rates, and homoplasy (wherein a particular haplotype has multiple origins due to identical base substitutions in separate individuals) of the hypervariable region I of the mitochondrial control region and found that this region of the mitochondrial genome had a higher substitution rate than previously noted. The results of this study indicated that some of what had previously been thought to be evidence for common ancestry between the two DPS's were actually parallel mutations in the sequence region of study, having occurred in both DPS's resulting in convergence of haplotypes rather than evidence of dispersal or gene flow. Ultimately, these results indicated that long-distance dispersal in Steller sea lions is less common than previously estimated. The authors showed that using their analysis, all three of the long distance dispersal events reported in the paper by Harlin-Cognato et al. (2006) were likely cases of homoplasy and not instances of gene flow. In a recent study, Phillips et al. (*in press*, 2011) documented only seven haplotypes occurring in both DPSs. These findings combined with those of Phillips et al. (2009*b*) describe a 30% reduction in the number of shared haplotypes between the two DPSs, further demarcating the genetic discontinuity between DPSs.

This recent paper (Phillips et al. 2011) addressed the effect of climate change in the form of glacial events on the evolution of Steller sea lions. They reported mtDNA sequence data from >1,000 pups taken throughout the species range and using three mtDNA regions; two coding genes and the control region. Using the method described in Phillips et al. (2009*b*) a fully resolved haplotype network allowed for a greater estimate of statistically significant associations of haplotype distributions to geography than was possible in Harlin-Cognato et al. (2006). This manuscript concludes that the effect of a glacial event on the species' demographics and

phylogeography has been dependent upon the effective population size at that time. Namely, they found that during historic glacial periods dispersal events were correlated with historically low effective population sizes, while range fragmentation type events were correlated with larger effective population sizes. Their study also documented further evidence for the division between the two DPS's (or subspecies) and dated the initial divergence between these lineages at approximately 360,000 years ago. They observed that this ancient population subdivision has led to the sequestering of most haplotypes as DPS, or subspecies specific (Phillips et al. 2011).

In 1998 Steller sea lion pups were first noted on Graves Rock just north of Cross Sound in Southeast Alaska. By 2002 the population had increased to approximately 100 pups and 50 of those pups were captured, branded, and tissue-sampled in July of 2002. Mitochondrial and microsatellite work with those samples revealed that approximately 70% of the pups had mtDNA haplotypes that were consistent with those found in the western DPS (Gelatt et al. 2007). Similarly, a rookery to the south on the White Sisters Islands near northern Chichagof Island where pups were first noted in 1990 was also sampled in 2002 and approximately 45% of those pups had western DPS haplotypes. Collectively, this information suggested that these two most recently established rookeries have been at least partially established by females that were born in the western DPS.

In two recent reports to the National Marine Mammal Laboratory, Bickham (2010*a*,*b*) reported new mtDNA data for eastern DPS rookeries from California and British Columbia. As recommended in the 2008 Steller Sea Lion Recovery Plan, a new analysis of the genetic structure of the southern and eastern-most rookery in the species description at Año Nuevo Island, California was initiated. As this is a small and difficult rookery from which to sample, the 13 tissue samples were collected from a combination of strandings and carcasses (6 pups, 2 fetuses, 2 adults, one yearling and 2 juveniles) collected during 2000-2009. Three mtDNA genes and 1 Y-chromosome gene were used to compare the specimens to the rest of the population. The control region results which are comparable to the largest data set used across the species range indicated that the Año Nuevo population fits within the eastern DPS and did not contain any new haplotypes or any haplotypes unique to the western DPS (Bickham 2010*a*). Likewise no new haplotypes or any haplotypes that were not previously found in the eastern DPS were found in the two protein coding genes, cytochrome *b* and ND1. Of the seven males in the data set, six had a common Zfy haplotype and a single male had a rare haplotype only found previously in Oregon and British Columbia, indicating some Y-chromosome diversity and male movement within the DPS. Comparing the mtDNA control region results with those of the only previous study by Ono (1993) indicated that haplotypic diversity had remained high in the intervening years (Ono (1993) H = 0.85; Bickham 2010*a* H = 0.89). Ono (1993) examined 13 samples and found 9 haplotypes. Bickham (2010*a*) also sequenced 13 samples and found 10 haplotypes including 5 of the same haplotypes described by Ono. Overall, Bickham (2010*a*) suggested that despite changes in abundance, the Año Nuevo population has not declined in genetic diversity and is not genetically unique.

At the British Columbia rookeries, all 52 specimens were collected from pups and were added to previously collected samples for a total of 67 samples from the area. All but one of the pups had haplotypes characteristic of the eastern DPS. The exception was haplotype 3BB which has been found previously in southeast Alaska but is most common in the western DPS from the western

Aleutians to Prince William Sound and Bickham (2010*b*) suggested represented a potential dispersal event. Bickham (2010*b*) also reported that his results were consistent with all previous genetic studies showing the differentiation of the eastern and western DPSs. The following information is excerpted from that report:

"*The examination of three mtDNA genes, including their comparison to large pre-existing datasets, shows that the four British Columbia rookeries as expected share haplotypes with the other eastern stock rookeries and are largely isolated from the western stock and Asian rookeries. However, there are some haplotypes whose distributions cross the eastern stock/western stock boundary. There are three possible explanations for this cross boundary distributional pattern. One explanation is that haplotypes can be transferred across the boundary by gene flow; i.e., successful migration with reproduction since we are studying pups taken at their natal rookeries. This almost surely happens, but rarely. The second explanation is that shared haplotypes are plesiomorphic (primitive) haplotypes whose distributions were established prior to the isolation of the eastern and western stocks. This easily explains broadly distributed and common haplotypes such as the control region haplotypes BB and A which are found throughout the range of the species and are two of the most common haplotypes. It can also explain disjunct distributions which on the surface appear to be the result of dispersal but in fact are due to a process known as lineage sorting. And third, trans-boundary haplotype distributions can be the result of homoplasy in which identical mtDNA sequences evolve independently due to the rapid rate of sequence evolution at certain hyper-mutable sites. This has been thoroughly discussed by Phillips et al. (2009b) who showed that this is a common phenomenon in control region haplotypes but the use of more conserved protein coding genes such as cytochrome b and ND1 help to resolve these errors. In fact, Phillips et al. (2009b) produced a highly resolved haplotype phylogeny for Steller sea lions by this method and resolved all apparent instances of long-range dispersal, as estimated using control region haplotypes alone, as being due to sequence homoplasy."(*Bickham 2010*b).*

Summary of Discreteness Findings

Overall, the observations of marked sea lion movements corroborate the extensive genetics research findings for a strong separation between the two currently recognized DPSs. Although recent colonization events in the far northern part of the eastern DPS indicate movement of the western DPS into this area this mixed part of the range remains small, and the overall discreteness of the eastern from the western DPS remains distinct. Hybridization among subspecies and species along a contact zone such as now occurs near the DPS boundary is not unexpected as the ability to interbreed is a primitive condition whereas reproductive isolation would be derived. In fact as stated in the 1996 policy (61 FR 47222) responses to previous comments, "*The Services do not consider it appropriate to require absolute reproductive isolation as a prerequisite to recognizing a distinct population segment*". The fundamental concept overlying this distinctiveness is the overwhelming collection of morphological, ecological and behavioral, and genetic evidence for DPS differences provided here. Although a few migrants a year may indeed occur and that in and of itself may be sufficient to prevent genetic differentiation among populations within a DPS (such as within the entire eastern DPS) there is no evidence to suggest such a rate of exchange is sufficient to merge distinct populations.

The published recommendation (Phillips et al. 2009*a*) and recognition for subspecies designation of the two DPS's further substantiates this justification. In addition, the persistent population trend trajectories combined with the physical and physiological differences, and behavioral characteristics unique to each DPS indicate that all of the potential factors in the discreteness criteria contribute to this continued separation and as such the population segment as described for this status review should be considered discrete.

2.1.2 Is the population segment delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act?

The population segment addressed for this analysis completely surrounds the portion of the population located in British Columbia, Canada. However, the current conservation and management plan for Steller sea lions in Canada is similar to the protection measures provided by the U.S. Marine Mammal Protection Act and thus the protection measures are not interpreted as being significantly different. Therefore, this condition is not met. Within Canada, Steller sea lions are included on the List of Wildlife Species at Risk as a species of special concern, and have been protected under the Species at Risk Act (SARA) since 2005. Under the SARA a species of special concern is one that because of their biology and identified threats could become threatened or endangered. In 2011 a Management Plan for the Steller Sea Lion was finalized (Fisheries and Oceans Canada 2010), identifying conservation activities and protection measures necessary to prevent them from becoming threatened or endangered, and with the ultimate goal of removing Steller sea lions from the List of Wildlife Species at Risk.

2.2 Significance of the Population Segment

The 1996 policy (61 FR 47222) states that if a population segment is considered discrete under one or more of the above conditions, its biological and ecological significance will then be considered in light of Congressional guidance that the authority to list DPSs be used sparingly while encouraging the conservation of genetic diversity. In carrying out this examination, the Services will consider available scientific evidence of the discrete population segments importance to the taxon to which it belongs. This consideration may include, but is not limited to, the following four pieces of evidence which are phrased as questions.

2.2.1 Is the persistence of the discrete population segment in an ecological setting unusual or unique for the taxon?

No. As noted above, the eastern DPS has consistently occupied this portion of its range for millennia, but there is evidence of northward range extension within the eastern DPS in the last 100 years. As to whether the ecological setting of southeast Alaska, British Columbia, and southward to Central California is unique to the taxon one could argue that the information presented previously combined with available studies of sea lion prey use and habitat areas would indicate that indeed these areas are unique. However, our interpretation of this criterion is that with almost one half of the global population residing in this area it is not unusual.

2.2.2 Is there evidence that the loss of the discrete population segment would result in a significant gap in the range of a taxon?

Yes. As currently designated the eastern DPS includes the entire Steller sea lion range east of 144° W longitude through southern California and constitutes approximately 47% of the global population. Losing this population would truncate the range in the Gulf of Alaska and eliminate all breeding areas from Southeast Alaska to Central California.

2.2.3 Is there evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range?

No. There are no records of an introduced population of Steller sea lions.

2.2.4 Is there evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics?

Yes. As noted previously the genetic characteristics of the two DPSs differ significantly leading to recommendation for sub species designation. The mtDNA haplotype frequency distributions are supportive of distinct differences in the two population segments while the similarities among sites within each segment confirm movement among the areas.

2.2.5 Summary of Significance Findings

In addressing whether the population segment is considered significant the policy also allows for consideration of other factors if they are appropriate to the biology or ecology of the species. Therefore, the information provided previously is relevant to the significance question as it was to the question of discreteness. This information is sufficient to determine that the population segment is discrete and significant and should retain its DPS designation.

2.3 Conservation Status

The conservation status comes into play once the population segment is determined to be distinct. The above information summarizes why the population segment does meet the criteria of a DPS and therefore this population is able to be considered discrete for the purposes of listing, delisting, and reclassifying.

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APPENDIX 2. Agreement between NMFS and State of Alaska on post delisting management actions related to fisheries and the MMPA.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

March 12, 2012

Doug Vincent-Lang
Acting Director
Division of Wildlife Conservation
State of Alaska, Department of Fish and Game
333 Raspberry Road
Anchorage, AK 99518-1599

Dear Mr. Vincent-Lang:

Staff from our respective organizations have been working cooperatively to develop information concerning actions the State of Alaska would implement in the event the National Marine Fisheries Service (NMFS) proceeds with a proposed rule to remove the "threatened" eastern Distinct Population Segment (DPS) of Steller sea lion from the list of endangered and threatened species under the Endangered Species Act. A key recommendation of the final 2008 Steller Sea Lion Recovery Plan was that as part of the de-listing process "agreement is reached with the State of Alaska which describes their fishery management plan, minimizes the take of Steller sea lions, and describes how future actions taken by the State will comport with the ESA and MMPA."

The State of Alaska submitted materials to NMFS describing these actions on February 24, 2012. I have reviewed this material and agree that the State has adequately described and addressed the recommendation of the Recovery Plan on this topic. We appreciate the collaboration and effort your staff has made over the last months in reaching this agreement.

Sincerely,

James W. Balsiger, Ph.D.
Administrator, Alaska Region

cc: Cora Campbell -- ADF&G, Commissioner
Moira Ingle -- ADF&G, Wildlife Biologist
Brad Meyen – DOL, Attorney

STATE OF ALASKA

DEPARTMENT OF FISH AND GAME

DIVISION OF WILDLIFE CONSERVATION

SEAN PARNELL, GOVERNOR

333 Raspberry Road
Anchorage, AK 99518-1599

February 24, 2012

James Balsiger,
Alaska Regional Administrator
NOAA Fisheries' National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

Re: Eastern DPS, Steller sea lion

Dear Dr. Balsiger:

As you are aware, the State of Alaska petitioned NMFS in 2010 to delist the Eastern Distinct Population Segment of Steller sea lions ("EDPS"). As part of the delisting process, the 2008 Steller Sea Lion Recovery Plan directs NMFS to reach agreement with the State regarding expected future management plans for fisheries that may interact with EDPS sea lions, including actions expected to minimize anthropogenic impacts on the population after delisting.

The attached document was prepared by the Alaska Department of Fish & Game in cooperation with the NMFS Protected Resources Division. It describes how future State fishery management actions within the breeding range of the EDPS will continue to comport with the Marine Mammal Protection Act and will continue to minimize incidental take of sea lions associated with those fisheries.

Please contact me at douglas.vincent-lang@alaska.gov or (907) 267-2339 with any questions.

Sincerely,

Doug Vincent-Lang
Acting Director, Division of Wildlife Conservation
Endangered Species Coordinator

Cc: Cora Campbell -- ADF&G, Commissioner
Moira Ingle -- ADF&G, Wildlife Biologist
Brad Meyen – DOL, Attorney
Dana Seagars -- NMFS Protected Resources Division
Clayton Jernigan – NOAA Office of the General Counsel

***How Future State of Alaska Fishery Management Actions Will Comport with the MMPA and Minimize Incidental Take of Eastern DPS Steller Sea Lions*.**

The Steller Sea Lion Recovery Plan (NMFS 2008) provides criteria for delisting that the National Marine Fisheries Service ("NMFS") must address before the agency takes action to delist the Eastern Distinct Population Segment ("EDPS") of Steller sea lions, currently listed as threatened under the Endangered Species Act ("ESA").

The Recovery Plan ("Plan") concludes that "*protection for the eastern [sea lion] population has been provided primarily by the MMPA, the Magnuson-Stevens Fishery Conservation and Management Act, and the Fisheries Act of Canada*." Plan, p. VII-1. The "*most important protection*" achieved under these statutes "*has likely been prohibitions on lethal takes*." Although none of the potential threats are considered likely to affect the recovery of the species, the Plan identifies several possible forms of increased disturbance by humans as the most likely threat facing the EDPS as it continues to expand its range. The Plan acknowledges, however, the demonstrated effectiveness of the existing regulatory mechanisms, including the Marine Mammal Protection Act ("MMPA"), which would remain in place after delisting under the ESA, to minimize potential impacts to sea lions related to human disturbance.

The Recovery Plan directs that, before it can delist the species pursuant to Section 4(c)(1) of the ESA, NMFS must first determine that certain demographic criteria are met. NMFS must then document that perceived threats to the DPS, as characterized under the five ESA listing factors, are reduced or eliminated to the point that ESA listing is no longer appropriate.[1] Regarding ESA listing factor D, the Plan enumerates actions that "could provide substantial insurance against future impacts from development and anthropogenic disturbance." One of those enumerated actions is for NMFS to reach agreement with the State of Alaska regarding expected future management plans for fisheries that may interact with EDPS Steller sea lions. Specifically, the Recovery Plan calls for:

- descriptions of relevant State fishery management plans;
- descriptions of how expected State actions minimize the take of [EDPS] Steller sea lions; and

[1] *See* 50 C.F.R. 402.02 definition: "*recovery* means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the Act."

- descriptions of how future actions taken by the State will comport with the ESA and MMPA.[2]

This document identifies and describes the State's general approach to management of particular fisheries and discusses certain current management measures to illustrate (i) how measures minimize take of sea lions and (ii) how they comport with the MMPA. NMFS fully recognizes, however, that fisheries management is a dynamic process that must be responsive to changes in socio-economic and environmental conditions. Accordingly, although there are currently no specific plans to do so, the State reserves the right to modify any of the existing management measures discussed in this document. The State anticipates that any such future changes would continue to comport with the MMPA.

State-managed Fisheries:

Each State-managed fishery referenced in this document is guided by a Fishery Management Plan developed by the Alaska Department of Fish and Game (ADF&G) and adopted by the Alaska Board of Fisheries. Section 118 of the MMPA requires NMFS to annually evaluate the potential for interaction between these State-managed fisheries and marine mammals. 16 U.S.C. 1387(c)(1). Section 118 also directs NMFS to publish an annual List of Fisheries ("List" or "LOF") that places all U.S. commercial fisheries into one of three categories based on the level of incidental serious injury and mortality of marine mammals associated with each specific fishery. Criteria for the three Tier 2 categories relevant to the EDPS are as follows:

List of Fisheries Category	***Annual mortality & serious injury as a proportion of PBR[3]***	***Incidental mortality descriptive term***
Category I	≥ 50 % of PBR	"frequent"
Category II	≥ 1% & ≤ 50%	"occasional"
Category III	≤ 1%	"remote"

Table 1. Criteria for classification of fisheries on MMPA Section 118 List of Fisheries.

[2] Although the Recovery Plan refers to "how future actions taken by the State will comport with the ESA and MMPA," in the event the EDPS is delisted, the ESA would not apply to the EDPS unless it were re-listed. The population would continue to be protected under the MMPA, however.

[3] "PBR" is the Potential Biological Removal level for each marine mammal stock. The MMPA defines the PBR level as the maximum number of animals, aside from natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population. 16 U.S.C. 1362(20).

Pursuant to its Section 118 authority, NMFS has identified six fisheries managed by the State of Alaska that may interact *directly* with marine mammals:

- Southeast Salmon Drift Gillnet;
- Alaska Yakutat Salmon Set Gillnet;
- Alaska Salmon Troll;
- Alaska Gulf of Alaska sablefish longline;
- AK State-managed waters longline/setline (including sablefish, rockfish, lingcod, and miscellaneous finfish); and
- Alaska Commercial Passenger Fishing Vessel (charter boat).

Each of these fisheries is included on the annual NMFS List (*see*, e.g., 76 FR 73912, November 29, 2011). The management plan for each fishery is described in Appendix I, with additional information and State management regulations available at http://www.adfg.alaska.gov/index.cfm?adfg=fishregulations.commercial.

Of the six fisheries identified on the List, only four (AK Southeast Salmon Drift Gillnet, AK Salmon Troll, AK Gulf of Alaska Sablefish Longline, and AK commercial passenger fishing vessel fisheries) have had direct interaction with EDPS Steller sea lions. The following table illustrates the categories and bases for assignment by NMFS for each of the State fisheries on the most recent List (November 29, 2011):

Fishery	***Category***	***Marine mammal species or stocks killed or injured***	***Basis (stock driving the current classification)***
AK Southeast salmon drift gillnet	II	Dall's porpoise, AK Harbor porpoise, Southeast AK Harbor seal, Southeast AK Humpback whale, Central North Pacific Pacific white-sided dolphin, North Pacific Steller sea lion, Eastern U.S.	Humpback whale, Central North Pacific
AK Yakutat salmon set gillnet	II	Gray whale, Eastern North Pacific Harbor porpoise, Southeast AK Harbor seal, Southeast AK Humpback whale, Central North Pacific (Southeast AK)	Harbor porpoise, Southeast AK

AK salmon troll	III	Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None; total annual mortality and serious injury is ≤ 1 % of the PBR level
AK Gulf of Alaska sablefish longline	III	Sperm whale, North Pacific Steller sea lion, Eastern U.S.	None; total annual mortality and serious injury is ≤ 1 % of the PBR level
AK State-managed waters longline/setline (including sablefish, rockfish, lingcod, and miscellaneous finfish)	III	None documented[4]	None; total annual mortality and serious injury is ≤ 1 % of the PBR level
AK commercial passenger fishing vessel	III	Killer whale, stock unknown Steller sea lion, Eastern U.S. Steller sea lion, Western U.S.	None; total annual mortality and serious injury is ≤ 1 % of the PBR level

Table 2. MMPA List of Fisheries classifications for State-managed fisheries within the breeding range of EDPS Steller sea lions, marine mammal species potentially affected, and stock/species driving the classification.

No State-managed fisheries are classified as Category I on the NMFS List. Two State-managed fisheries that operate within the breeding range of EDPS Steller sea lions are classified as Category II, but not because of reported interactions with EDPS sea lions. Instead, the Southeast Salmon Drift Gillnet Fishery is classified as Category II due to reported interactions with Central North Pacific humpback whales. In turn, the Yakutat Salmon Set Gillnet Fishery is classified as Category II due to interactions with harbor porpoises. If not for the interactions with humpback whales or harbor porpoises, the minimal past interactions of these fisheries with EDPS Steller sea lions would qualify them for classification as Category III fisheries (i.e., less than 1% annual mortality or serious injury as a proportion of PBR).

NMFS classifies the remaining three State-managed fisheries within the breeding range of the EDPS as Category III, indicating only a remote likelihood or no known levels of

[4] This fishery is included here on the basis of analogy with the Federally managed Gulf of Alaska Sablefish Longline fishery, which has reported serious injury/mortalities of EDPS Steller sea lions. Although no such interactions have been reported in the State-managed fishery in State of Alaska waters, the two fisheries operate in similar means (e.g., time, space, and gear) and the State fishery occurs within the range of seasonal concentrations of foraging EDPS sea lions; thus it is reasonable to consider that such interactions may occur.

incidental mortality or serious injuries to marine mammals, including EDPS Steller sea lions. Although NMFS observers have not directly monitored any of these three fisheries,[5] the absence of reported interactions or other anecdotal information (e.g., logbook data) confirms that the level of incidental mortality and serious injuries to EDPS Steller sea lions associated with these fisheries is likely less than one percent of the PBR level for the stock. More details concerning estimated levels of incidental catch and/or serious injury or mortality are identified in the annual Stock Assessment Reports issued by NMFS (e.g., Allen and Angliss 2010).

State management measures that limit effects on EDPS sea lions in LOF Fisheries. None of the State-managed fisheries on the current LOF has more than a "remote" likelihood of causing incidental mortality or serious injury to EDPS Steller sea lions. The fisheries have maintained this status for 10 to 15 years, depending on the fishery, indicating that State management strategies have minimized the take of EDPS Steller sea lions, consistent with NMFS's Recovery Plan for the species. Based on this information, State-managed fisheries within the breeding range of EDPS Steller sea lions have minimal direct effects on this population. The EDPS Steller sea lion is not identified as the "driving" species or stock for any Category II classifications, and for two of the LOF fisheries, there is no known incidental mortality or injury of sea lions associated with the fishery. Thus, by implication, few fishery management measures directed at minimizing sea lion mortality are necessary, since the EDPS population continues to increase even in the core areas of these active fisheries.[6]

Attributing an absence of mortality to specific fishery management measures is not possible. In general, however, the science-based management approach followed by the State results in abundant escapement of targeted species and limited bycatch of non-target species. In addition, season and area restrictions and gear limitations for these fisheries limit any direct or indirect effects on EDPS sea lions. For example, although the fisheries are prosecuted near but outside rookeries and haulout areas protected as critical habitat under 50 CFR 226.202, there is no indication that the location or timing of current fishery activities has impacted the recovery of the EDPS population.

[5] As of the date of this document, no monitoring of these fisheries has occurred. NMFS has contracted with an observer group to observe the State-managed District 6 and District 8 driftnet fisheries (near Wrangell and Petersburg) in 2012 and 2013, however. http://www.saltwaterinc.com/alaska_marine_mammals_program_saltwater_inc/alaska_marine_mammal_boat_operators_saltwater_inc.html

[6] The Recovery Plan concludes that "the level of intentional and incidental killing of Steller sea lions by humans has apparently been relatively small as the population has been increasing for about 30 years." Recovery Plan, p. VI-3. On page VI-5, the Plan reports that "the eastern DPS of Steller sea lion has also increased at approximately 3% /year . . . ."

Some fisheries may interact indirectly with EDPS sea lions. As with all its fisheries, the State carefully manages these fisheries through a science-based, biologically sound regulatory process that accounts for and fully comports with the MMPA. Although there are currently no specific plans to modify any of the existing management plans for these fisheries, the State receives new regulatory proposals on a three-year cycle and reserves the right to modify those plans. The State anticipates that any such future modifications would continue to comport with the MMPA.

How the State will continue to minimize the take of EDPS Steller sea lions:

Current State management achieves insignificant levels of mortality. The State of Alaska supports the continued conservation of all marine mammals, including the EDPS of Steller sea lions. The State also recognizes and supports the goal identified in MMPA Section 118(a) that commercial fisheries will achieve and maintain insignificant levels of incidental mortality and serious injury of marine mammals. The State will continue to collaborate with NMFS to implement, through its State fishery licensing program, the requirement under 16 USC 1387(c)(2) for owners of fishing vessels or gear engaging in a Category I or II fishery to register with NMFS and to obtain a marine mammal authorization to lawfully take non-endangered and non-threatened marine mammals incidental to commercial fishing operations. Category III fisheries are exempt from this requirement. Accordingly, and as documented by the LOF, the consistently minimal level of direct or indirect interactions between fisheries and marine mammals indicates that under current State management, the Category III fisheries and each of the Category II fisheries identified above have achieved insignificant levels of serious injury and mortality of EDPS Steller sea lions, in compliance with MMPA Section 118(b).

Reporting requirements. The State also affirmatively supports actions to ensure that vessel owners and operators promptly report to NMFS any incidental injuries to or mortalities of marine mammals that may occur during commercial fishing operations, regardless of the category in which the fishery is placed (i.e., Category I, II, or III), as required by MMPA Section 118(e). Such reports must be submitted within 48 hours of the end of the fishing trip.

In addition, the State supports actions to ensure that vessel owners and operators are familiar with the MMPA definition of injury: i.e., “a wound or other physical harm. In addition, any animal that ingests fishing gear or any animal that is released with fishing gear entangling, trailing, or perforating any part of the body is considered injured, regardless of the presence of any wound or other evidence of injury, and must be reported.” 50 CFR 229.2. Of particular relevance to EDPS Steller sea lions, the State recognizes the importance of ensuring that vessel owners and operators in the Alaska Salmon troll and the Alaska Commercial Passenger Fishing Vessel (Charter Boat) fisheries are aware of this definition and the reporting requirements. The State uses

several means to inform fishermen of their responsibilities to adhere to NMFS marine mammal guidelines and reporting requirements.

Other current management activities that minimize take of EDPS Steller sea lions. The intent of the State to work cooperatively with NMFS with respect to conservation of threatened and endangered species was formalized in a 2009 cooperative agreement,[7] which outlines a "cooperative program for the conservation of endangered and threatened species, which may involve law enforcement, research, management, and public information and education activities for the benefit of resident endangered and threatened species" in Alaska. Consistent with that agreement, and in addition to managing fisheries that achieve insignificant levels of marine mammal mortality, the State currently works cooperatively with NMFS to carry out an active **public outreach program** and to reinforce federal **law enforcement** efforts.

The State also maintains its own Marine Mammal Program, including a research program that focuses on both the Eastern and Western DPSs of Steller sea lions. The **ADF&G sea lion research program** collaborates extensively with outside cooperators, including NMFS. The State program comprehensively examines sea lion population dynamics, physiology and disease, animal movements and diving behavior, genetics, nutrition, and body condition, and makes use of extensive in-house laboratory analysis capabilities along with a complete set of specialized equipment and skiffs. Long-term collaboration with the NOAA National Marine Mammal Laboratory, the University of Alaska, the Alaska SeaLife Center, the University of British Columbia, and numerous other cooperating institutions ensures that ADF&G staff maximize use of collected field data and samples and effectively coordinate resources and knowledge to better support recovery of Steller sea lion populations in all regions of Alaska.

State staff also participate in the interagency **Pinniped Entanglement Group**, regularly partnering with NMFS to report and assist in responses to marine mammal strandings, and to report any sea lions that may become hooked or entangled in fishing gear. To further minimize entanglements, ADF&G is also working to educate the public and fishermen about reducing ocean debris, and working with the fishing industry to develop modified gear or deterrents to keep sea lions away from fishing boats. More information

[7] The *Limited Cooperative Agreement Between the United States Department of Commerce National Oceanic and Atmospheric Administration National Marine Fisheries Service and the Alaska Department of Fish and Game for the Conservation of Threatened and Endangered Species* provides that:[T]he parties to this agreement are in accord that the programs administered by the State of Alaska are designed to conserve resident endangered and threatened species, and that it is the mutual desire of ADF&G and NMFS to cooperate for the common purpose of planning, developing, and conducting programs to protect, manage, and enhance populations of all resident endangered and threatened species covered by this agreement within the State of Alaska;

on State sea lion research programs may be found at http://www.adfg.alaska.gov/index.cfm?adfg=marinemammalprogram.stellerprogram

Potential future monitoring. Under certain conditions, MMPA Section 118 and its implementing regulations can require monitoring of fisheries to determine levels of incidental catch and serious injury. The State continues to support efforts by NMFS to monitor various fisheries via observer programs or other means (e.g., directed research), consistent with the agency's authority under Section 118. These programs can help not only to determine levels of incidental catch or injury, but also to collaboratively identify or devise mechanisms to reduce and minimize such interactions through gear alterations or fisheries management measures (e.g., season or area restrictions). The State recognizes that NMFS is authorized to take action to impose measures to reduce take in fisheries as set forth in Section 118. The State believes that NMFS's authority to address these contingencies, should they arise, together with State fishery management practices and State and Federal laws and regulations that protect marine mammals, will continue to minimize take of EDPS Steller sea lions in State-managed fisheries.

Future actions taken by the State will continue to comport with the MMPA:

Under the ESA, de-listing the EDPS would be warranted if NMFS determines that the species has "recovered," indicating that its population status has improved to the point at which listing is no longer appropriate under the criteria set out in ESA Section 4. 50. C.F.R. 402.02. In the event that NMFS removes the EDPS of the Steller sea lion from the list of threatened species, the State of Alaska notes with approval that provisions of the MMPA and its implementing regulations will continue to provide adequate protection to the population and its habitat.

Particularly relevant to the proposed de-listing action for EDPS Steller sea lions are the MMPA prohibitions on "take."[8] This continuing prohibition provides the protection necessary for growing colonies of EDPS Steller sea lions on rookeries and haulouts throughout its range. In addition, the State will continue to work cooperatively with NMFS to carry out an active public education program, reinforced by diligent, cooperative law enforcement. Through its Marine Mammal Program and participation in the interagency Pinniped Entanglement Group, the State will also continue to partner with NMFS to report and assist in responses to marine mammal strandings, and to report any Steller sea lions that may become hooked or entangled in fishing gear.

[8] Including "harassment" as defined in MMPA Section 3(18): "any act of pursuit, torment, or annoyance which (i) has the potential to injure a marine mammal stock in the wild; or (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of breeding patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering."

Moreover, State research staff will continue to work collaboratively with NMFS on research designed to ensure sound management and continued stability of the EDPS Steller sea lion.

Finally, the Alaska Departments of Fish and Game (Habitat Division), Natural Resources, and Environmental Conservation regularly conduct compliance reviews of proposed projects that may interact with fish and wildlife species and their habitat within Alaska lands and waters. These reviews will continue to consider any possible consequences that such projects may have on EDPS Steller sea lions, and will continue to recommend appropriate design alternatives that may eliminate or minimize adverse effects to the population and its habitat, in accordance with the MMPA and other Federal and State wildlife laws and regulations.

APPENDIX I

Descriptions, State of Alaska Management Plans
Category II and III Fisheries, MMPA Section 118 "List of Fisheries"

AK Southeast Salmon Drift Gillnet Fishery

Fishing gear type: Gillnet

Current category: Category II

Basis for current classification on the List of Fisheries: The total annual incidental mortality and serious injury of humpback whale (Central North Pacific stock) in this fishery is greater than 1% and less than 50% of the stock's Potential Biological Removal (PBR) level.

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Dall's porpoise, AK; Harbor porpoise, Southeast AK; Harbor seal, Southeast, AK; Humpback whale, Central North Pacific[(1)] ; Pacific white-sided dolphin, central North Pacific; Steller sea lion, Eastern U.S..

Estimated number of current participants: In 2010, 474 permits were renewed of which 422 were fished

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the LOF: 1996

Category when originally listed: Category II

Basis for original classification on the List of Fisheries: This fishery was categorized as a Category II because observer and stranding data indicated that incidental mortality and serious injury of harbor porpoise (Southeast AK) was 3 animals/year, or 1.3% of PBR (PBR=231); and incidental mortality and serious injury of humpback whale (Central North Pacific) was 0.13 animals/year, or 4.6% PBR (PBR=2.8). Also, Category III reports from fishermen indicated that mortalities of both species occurred prior to 1994.

Estimated number of participants when originally listed: 443

Past names, if any: Southeast Alaska salmon drift gillnet (until 2001).

Gear description/method for fishing: This fishery uses drift gillnet gear with soak times of 20 minutes to 3 hours. The gear is set during the day and night, with 6-20 sets set per day.

[1] The fishery is classified based on mortalities and serious injuries of a marine mammal stock greater than 1% and less than 50% (Category II) of the stock's Potential Biological Removal (PBR) level.

Target species: Salmon.

Spatial/temporal distribution of effort: There are five traditional drift gillnet areas in Southeast Alaska. These areas include Tree Point (District 1), Prince of Wales (District 6), Stikine (District 8), Taku (District 11) and Lynn Canal (District 15). These areas generally open from mid-June to early October for two to five days per week on a weekly basis depending on salmon run strength. In addition to the five traditional fishing areas, there are also drift gillnet fisheries in the Annette Island reserve, in terminal harvest areas (THA) adjacent to hatchery facilities, and for hatchery cost recovery. In years when Chinook salmon run strength is sufficient to support directed fisheries, the Stikine and Taku areas may open in early May. The majority of salmon are caught by drift gillnets in the five traditional fishing areas (73% for the recent 10-year average) and the THAs (17% for the recent 10-year average), with relatively small contributions from Annette Island (9% for the recent 10-year average), and for hatchery cost recovery (1% for the recent 10-year average).

Levels of observer coverage each year[2]: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Board of Fisheries and the Alaska Department of Fish and Game as a limited entry fishery with gear restrictions on the mesh and net size, and area closures.

History of Changes on the LOF

2009 LOF: Estimated number of participants updated from 481 to 476.

2006 LOF: Added a superscript “1” in Table 1 after humpback whale (Central North Pacific), indicating that takes of this stock are driving the classification of the fishery.

2001 LOF:

- Renamed this fishery from “Southeast AK salmon drift gillnet” to "AK Southeast salmon drift gillnet.”
- Estimated number of participants updated from 439 to 481.

1999 LOF: Estimated number of participants updated from 452 to 439.

1998 LOF:

- The stock of harbor porpoise on the list of species/stocks killed/injured in this fishery was changed from “AK” to “Southeast AK.”
- Estimated number of participants updated from 443 to 452.

[2] Observer coverage levels include the latest information reported in the most current final Stock Assessment Reports (SAR)

AK Yakutat salmon set gillnet

Fishing gear type: Gillnet

Current category: Category II

Basis for current classification on the List of Fisheries: Harbor porpoise incidental take >1% PBR, but <10% PBR.

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Harbor Porpoise [(1)], Eastern North Pacific gray whale, Southeast Alaska harbor seal, Central North Pacific (Southeast Alaska) humpback whale.*

Estimated number of current participants: 166

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 1996

Category when originally listed: Category II

Basis for original classification on the List of Fisheries: Logbook data showed total known incidental mortality and serious injury for harbor porpoise across all fisheries does not exceed 10% PBR, but low levels of observer coverage have been inadequate and data suggests levels may be >10%. Known incidental mortality and serious injury of harbor porpoise for this fishery is 30/year (1.5% PBR).

Estimated number of participants when originally listed: 152

Past names, if any: None.

Gear description/method for fishing: Set gillnet

Target species: Salmon

Spatial/temporal distribution of effort: The season runs from June 4 to mid-October in the Yakutat Alaska area. The Yakutat set gillnet fisheries are divided into two fishing districts, the Yakutat District and the Yakataga District. The bulk of the Yakutat salmon harvest is usually reported from a few fisheries but as many as 25 different areas are open to commercial fishing each year. With few exceptions, gillnetting is confined to the intertidal area inside the mouths of the various rivers and streams, and to the ocean waters immediately adjacent to each. Due to the terminal nature of these fisheries ADFG has been able to develop escapement goals for most of the major and several of the minor fisheries.

Levels of observer coverage each year: Observed in 2007 (5.3% overall coverage) and 2008 (7.6% overall coverage).

Management and regulations:

This fishery is managed by the Alaska Board of Fisheries and the Alaska Department of Fish and Game as a limited entry fishery with gear restrictions on the mesh and net size, and time and area closures.

The Yakutat area encompasses the waters of Alaska between Cape Suckling and Cape Fairweather. The area is divided into two fishing districts: the Yakataga District between Cape Suckling and Icy Cape, and the Yakutat District between Icy Cape and Cape Fairweather. All five salmon species are harvested in the Yakutat area, with sockeye, coho, Chinook, and pink salmon comprising the majority of the catch in order of commercial value.

Set gillnet gear is the only net gear permitted in the Yakutat area. About 170 commercial setnet entry permits are renewed annually. Setnet permit holders in the Yakutat area do not have registered sites and may fish in any open fishing area. They may also move between fishing areas during the season as long as not more than one area is fished concurrently.

There are 25 unique setnet fisheries in the Yakutat area. Most of these fisheries target sockeye salmon from mid-June through July and coho salmon in August and September. The only targeted pink salmon fishery occurs in the southeast portion of Yakutat Bay on fish returning to Humpback Creek. Set gillnet fisheries in the Yakataga District primarily harvest coho salmon.

Each unique set gillnet fishery area is managed on a weekly basis by adjusting fishing time and/or area by emergency order in response to inseason assessments of run strength. These actions are taken to provide adequate spawning escapements and to allow harvests of salmon that are surplus to escapement goals. Inseason assessment methods include both fishery performance and spawning escapement information. In the glacial systems, fishery performance data is utilized for management because poor visibility prevents the accurate observation of spawning escapements. The most important inseason stock assessment project in the Yakutat area is the Situk River adult salmon counting weir. Salmon passage through the weir is monitored and fishery openings for the Situk-Ahrnklin Inlet and Yakutat Bay are adjusted specifically in response to the weir counts. Several of the Yakutat set gillnet fisheries initial opening date are specified by regulation [5 AAC 30.310] and the rest are opened and closed by emergency order. The areas with set opening dates include the Alsek River (first Sunday in June), the Dangerous River (second Sunday in June), the Situk-Ahrnklin Inlet, Lost River, and Yakutat Bay (third Sunday in June), and the East River (fourth Sunday in June).

<u>History of changes on the List of Fisheries:</u>

2009: Estimated number of participants/vessels updated to 166.

2006: Central North Pacific Humpback Whale (Southeast AK) added to list of species incidentally killed/injured to update stocks associated with newly delineated (into more discrete fisheries according to area, gear and target species to reflect fisheries as managed under the FMPs) fisheries in 2004.

2001: Estimated number of participants/vessels updated to 170.

1999: Eastern North Pacific Gray Whale added to stocks incidentally killed/injured.
Estimated number of participants/vessels updated to 139.

1998: Estimated number of participants/vessels updated to 147.

1996: Added to the List of Fisheries as a Category II fishery.

* Additional information:

There has been an observation of interaction between this fishery and an EDPS Steller sea lion, based on one report of a self-released incidental take in 2008 (Manly 2009).

AK Salmon Troll Fishery

Fishing gear type: Troll

Current category: Category III

Basis for current classification on the List of Fisheries: The total annual incidental mortality and serious injury of a stock in a given fishery is less than or equal to 1 percent of the PBR level (i.e., a remote likelihood or no known incidental mortality and serious injuries of marine mammals)

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Steller sea lion, Western U.S. and Steller sea lion, Eastern U.S.

Estimated number of current participants: In 2010, a total of 2,006 power and hand troll permits were issued of which 1,068 permits were fished

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 1996

Category when originally listed: Category III

Basis for original classification on the List of Fisheries: This fishery was categorized as a Category III fishery because 1990 logbook data indicated that incidental takes were less than 10% of PBR, and known Steller sea lion incidental mortalities and serious injuries were less than 1% of PBR.

Estimated number of participants when originally listed: 1450

Past names, if any: None.

Gear description/method for fishing: This fishery uses salmon troll gear.

Target species: Salmon.

Spatial/temporal distribution of effort: The commercial troll fishery in Southeast Alaska and Yakutat (Region 1) occurs in State of Alaska waters and in the Federal Exclusive Economic Zone (EEZ) east of the longitude of Cape Suckling. The winter season is defined as October 1–April 30, or until 45,000 Chinook salmon are harvested, followed by the summer season from May 1 (or the end of the winter season) to September 30.

By regulation, the open area during the winter fishery is restricted to those areas of Southeast Alaska lying east of the surf line south of Cape Spencer, and the waters of Yakutat Bay [5 AAC 29.020 (b)]. All outer coastal areas, including the EEZ, are closed during the winter fishery. The summer season is divided into the spring and general summer fisheries. The spring fisheries are intended to increase the harvest of Alaska hatchery-produced Chinook salmon and occur primarily in inside waters near hatchery release areas or along migration routes of returning hatchery fish. These fisheries begin after the winter fishery closes and may continue through June 30. The spring troll fisheries can begin prior to May 1 if the

winter fishery closes early, when the harvest cap of 45,000 Chinook salmon is reached. The general summer fishery opens July 1 and harvests the majority of the annual Chinook salmon quota. During the summer fishery, most waters of the Southeast Alaska–Yakutat area are open to commercial trolling, including outer coastal waters. The general summer fishery is open by regulation through September 20 unless the department determines that coho salmon abundance is high in which case the fishery can be extended through September 30.

Levels of observer coverage each year: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Board of Fisheries and the AK Department of Fish and Game as a limited entry fishery with gear restrictions and area closures.

History of Changes on the List of Fisheries:

2009 LOF: Estimated number of participants/vessels updated to 2,045.

2001 LOF:

- Western DPS of the Steller sea lion added to list of species killed/injured in this fishery.
- Estimated number of participants/vessels updated to 2,335.

1999 LOF: Estimated number of participants/vessels updated to 1,149.

1998 LOF: Estimated number of participants/vessels updated to 1,278.

1996 LOF: Added to the List of Fisheries as a Category III fishery.

AK State-managed waters longline/set line (including sablefish, rockfish, lingcod, and miscellaneous finfish)

Fishing gear type: Longline

Current category: Category III

Basis for current classification on the List of Fisheries: No documented interaction with marine mammals.

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): None.*

Estimated number of current participants (sablefish only): In 2010, 24 longline permits were issued for SSEI of which 23 were fished. In addition, 3 pot permits were issued for SSEI in 2010 and all of those permits were fished. A total of 93 longline permits were issued for NSEI of which 87 were fished (there is no pot fishery allowed for NSEI).

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 2001

Category when originally listed: Category III

Basis for original classification on the List of Fisheries: This fishery was categorized as a Category III fishery because there were no documented interactions with marine mammals.

Estimated number of participants when originally listed: 731 (including sablefish, rockfish, lingcod, and miscellaneous finfish)

Past names, if any: None.

Gear description/method for fishing: This fishery uses longline gear.

Target species: Sablefish.

Spatial/temporal distribution of effort: Southeast Alaska State sablefish fisheries are split into two areas: NSEI, where fishing occurs primarily in Chatham Strait, and SSEI, where fishing occurs primarily in Clarence Strait and the adjacent waters of Dixon Entrance. The NSEI fishery is open between August 15 and November 15. The SSEI fishery is open for longline gear between June 1 and August 15 and for pot gear from September 1 to November 15.

Levels of observer coverage each year: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Board of Fisheries and the AK Department of Fish and Game as a limited entry fishery with gear restrictions and area closures.

History of Changes on the List of Fisheries (sablefish, rockfish, lingcod, and miscellaneous finfish):

2009 LOF:

- This fishery was renamed "AK State-managed waters longline/set line (including sablefish, rockfish, lingcod, and miscellaneous finfish)" to more accurately reflect the current target species.
- Estimated number of participants/vessels updated to 1,448.

2001 LOF: Added to the List of Fisheries as a Category III fishery. Created by splitting the "AK southern Bering Sea, Aleutian Islands, and Western Gulf of Alaska sablefish longline/set net (federally regulated waters)" into 3 fisheries to make the LOF consistent with the Stock Assessment Reports and observer data for these fisheries.

* Additional information:

This State of Alaska-managed fishery has been included within this agreement on the basis of analogy with the Federally managed Gulf of Alaska Sablefish Longline Fishery. That fishery has had reported serious injury/mortalities of EDPS Steller sea lions. Although no such interactions have been reported in the Alaska waters fishery, these two fisheries operate in similar means (time, space, gear) and the Alaska fishery occurs well within the range of seasonal concentrations of foraging EDPS Steller sea lions, thus making it reasonable to conclude that such interactions may occur.

AK Commercial Passenger Fishing Vessel (Charter Boat) Fisheries

Fishing gear type: Sport fishing gear

Current category: Category III

Basis for current classification on the List of Fisheries: The total annual incidental mortality and serious injury of a stock in a given fishery is less than or equal to 1 percent of the PBR level (i.e., a remote likelihood or no known incidental mortality and serious injuries of marine mammals)

Current list of marine mammal species/stocks injured/killed (a (1) indicates those stocks driving the fishery's classification): Killer whale, stock unknown; Steller sea lion, Western U.S. and Steller sea lion, Eastern U.S.

Estimated number of current participants: All Alaska Sport Fish Charter Businesses and Guides providing guided sport fishing services for compensation must be licensed with the Alaska Department of Fish and Game. In 2010, there were 1,172 active saltwater charter vessels offering sport fish charter services in Alaska. Of the 1,172 saltwater vessels, 644 or 55% operated in Southeast Alaska and 528 or 45% operated on Southcentral Alaska. The Division of Sport Fish boundary between Southeast and Southcentral Alaska is at Cape Suckling; 59°59'30"N, 143° 53'00".

Take Reduction Teams/Plans that affect this fishery: None.

Year added to the List of Fisheries: 1996

Category when originally listed: Category III

Basis for original classification on the List of Fisheries: No details given. No logbook, observer, or stranding data available.

Estimated number of participants when originally listed: 1,243 (for all states: AK, WA, OR, and CA)

Past names, if any: None.

Gear description/method for fishing: Licensed guides must adhere to the same regulatory methods and means as nonguided private sport anglers. A licensed guide must not aid in the commission of any sport fish violation or permit the commission of a sport fishing violation by a client as outlined in AS 16.05 – AS 16.40 or any sport fish regulation adopted under AS 16.05 – AS 16.40.

Target species: Various species of salmon and groundfish and other miscellaneous sport species.

Spatial/temporal distribution of effort: In 2010, there were a total of 48,753 trips targeting guided salmon, bottomfish, or bottomfish/salmon combination trips statewide. Of the 48,753 trips, 27,821 or 57% took place in Southeast Alaska and 20,932 or 43% took place in Southcentral Alaska. Charter operators are required to indicate a Port of Offloading for each trip; defined as the port or community where clients and fish are offloaded. Based on 2010 logbook records, the most popular Port of

Offloading in Southeast Alaska was Sitka, followed by Ketchikan, Auke Bay (Juneau), Waterfall, and Craig, in descending order. In Southcentral Alaska, the busiest Port of Offloading was Homer, followed by Seward, Deep Creek, Anchor Point, and then Valdez.

Levels of observer coverage each year: This fishery has not been observed by the Alaska Marine Mammal Observer Program.

Management and regulations: This fishery is managed by the Alaska Department of Fish and Game under allocation guidelines established by the Alaska Board of Fisheries for all species except halibut. Charter halibut fisheries are managed under allocation guidelines established by the North Pacific Fisheries Management Council and the International Pacific Halibut Commission. Charter halibut fisheries in IPHC Regulatory Areas 2C (southeast Alaska) and 3C (Southcentral Alaska) are managed as limited entry fisheries by the National Marine Fisheries Service. A logbook program operated by the Alaska Department of Fish and Game monitors participation and client effort and catch in these fisheries.

History of Changes on the List of Fisheries:

2009 LOF: Estimated number of participants/vessels updated to >7,000 (2,702 for AK only).

2006 LOF: The killer whale (stock unknown), Eastern DPS and Western DPS of the Steller sea lion added to the list of species incidentally killed/injured to update stocks associated with newly delineated (into more discrete fisheries according to area, gear, and target species to reflect fisheries as managed under the FMPs) fisheries in 2004.

2001 LOF: Estimated number of participants/vessels updated to >7,000 (1,107 for AK only).

1999 LOF: Estimated number of participants/vessels updated to >4,000.

1998 LOF: Estimated number of participants/vessels updated to >17,000 (16,276 for AK only).

1996 LOF: Added to the List of Fisheries as a Category III fishery as “AK, WA, OR, CA commercial fishing passenger vessel.”

APPENDIX 3. (Draft) Post Delisting Monitoring Plan.

DRAFT

Post Delisting Monitoring Plan for the Eastern Distinct Population Segment of Steller Sea Lion

March 2012 DRAFT

National Marine Mammal Laboratory
Alaska Fisheries Science Center
NOAA Fisheries Service
7600 Sand Point Way NE, Seattle WA 98115

Address questions about the monitoring plan to:
Protected Resources Division, NMFS Alaska Regional Office
PO Box 21668, Juneau, AK 99802-1668

Recommended Citation:
NOAA Fisheries Service. 2012. DRAFT Post Delisting Monitoring Plan for the Eastern Distinct Population Segment of Steller Sea Lion. 25 pp.

Cover photo: the Steller sea lion rookery at North Rock, Forrester Island Complex, Southeast Alaska on 24 June 2009, with 1,239 adult and juvenile Steller sea lions and 1,223 pups. Photographs were taken at an altitude of 700 feet under the authority of NMFS ESA/MMPA research permit 14326 issued to the National Marine Mammal Laboratory, NMFS Alaska Fisheries Science Center, Seattle, WA. Photo mosaic by K. Sweeney

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Background and Introduction

The Steller sea lion (*Eumetopias jubatus*) was listed as threatened range-wide under the Endangered Species Act (ESA) in 1990 (FR 55(227): 49204). The species inhabits the north Pacific Ocean from California north through Oregon, Washington, British Columbia (Canada), and Southeast Alaska; west through the Gulf of Alaska, Aleutian Islands, and Bering Sea in Alaska; and in eastern Russia and northern Japan. This range-wide action was taken because of a precipitous decline in abundance in the 1970s and 1980s in portions of Alaska west of Cape Suckling (60°N, 144°W) and in Russia. At that time the stock structure of the Steller sea lion in the North Pacific was unknown, and it was not until 1997 that the two distinct population segments (DPSs) of the Steller sea lion (eastern and western, separated at 144°W) were recognized based on distinct and significant differences in genetics, morphometry and population trend (Dizon et al. 1992; Loughlin 1997; FR 62(86): 24345-24355; FR 62(108): 30772-30773; see review of stock distinctness in NMFS 2012).

NOAA Fisheries Service (NMFS) established recovery criteria for both DPSs in the Steller sea lion Recovery Plan (NMFS 2008). NMFS was petitioned by the States of Oregon, Washington and Alaska to delist the eastern DPS of Steller sea lion since, in their opinion, the status and trend of the eastern DPS had satisfied recovery criteria in the Recovery Plan, and all significant threats to recovery had been mitigated or were no longer extant (NMFS 2008). A key recommendation of the Recovery Plan was that as part of a process to de-list the stock a Post Delisting Monitoring Plan (PDMP) be in place. NMFS has prepared a Draft Status Review of the Eastern DPS of Steller sea lion and has made it available for pubic review _____(insert FRnotice number and date). NMFS published (DD MM 201Y, ZZ FR ZZZZZ) a Notice of Intent and rule proposed rule to change the listing status of the eastern DPS of Steller sea lion. As part of this process NMFS solicits comments received on this Draft PDMP and the draft Status Review. Comments will be reviewed and a Final PDMP will be issued in the event a Final Rule delisting the eastern DPS is issued.

Steller Sea Lion Protection and Monitoring under Other Laws

In the United States the eastern DPS of Steller sea lion is protected under the Marine Mammal Protection Act (MMPA, as amended in 1994) regardless of status under the ESA. The MMPA prohibits taking (i.e., to harass, hunt, capture, kill or collect, or attempt to harass, hunt, capture, kill or collect) marine mammals except as permitted or authorized under special circumstances (e.g., incidental to research or commercial fishing activities, subsistence harvests by Alaska Natives). Under the MMPA Steller sea lions are classified as a strategic stock and designated as depleted throughout their range. Though this status may be subject to change post-delisting, MMPA protections remain in effect, and there are also non-federal protections. In California, the rookery on Año Nuevo Island is within the Año Nuevo State Park and Nature Preserve, and on the Farallon Islands is within the Farallon National Wildlife Refuge. In Oregon, nearly all sites used by Steller sea lions are within the Oregon Islands National Wildlife Refuge, where

human activity is prohibited except by permit. State regulations prohibit disturbance to wildlife species for which hunting regulations do not exist. Boaters are restricted from approaching near one of the three rookeries during the breeding season; the other two have closures to sport and commercial fishing operations near the rookeries during the breeding season. In Washington many sites used by Steller sea lions are on National Wildlife Refuge lands, where human activity is restricted except by permit. Federal and State regulations in Washington prohibit boaters from approaching near Steller sea lions. In Alaska, many terrestrial and marine areas used by Steller sea lions fall within National or State Parks, Refuges, or Recreation Areas and Southeast Alaska is covered by four area management plans implemented by the Alaska Department of Natural Resources to manage land-use activities in sensitive habitats.

In Canada, Steller sea lions are conserved and managed under authority of the Fisheries Act (1985) and subsequent Marine Mammal Regulations (MMR, 1993). Except for people of First Nations, the MMR prohibits fishing for or disturbance of any marine mammal except as may be permitted by license. The Species At Risk Act (SARA, 2003) provides additional management requirements to prevent species of special concern, such as the Steller sea lion, from becoming endangered or threatened and a Steller sea lion management plan was published in 2010 (Fisheries and Oceans Canada 2010). Many sea lion rookeries and haulouts are protected within Ecological Reserves, National Park Reserves, or are within National or Provincial Parks.

In the United States, NMFS is required under Section 117 of the MMPA to update Marine Mammal Stock Assessment Reports annually for strategic stocks, and triennially for non-strategic stocks. Stock Assessment Reports (SARs) review the population status and trend, estimates mortality and serious injury rates due to anthropogenic causes, describes other factors that may affect stock status (NMFS 2005). Thus estimates of Steller sea lion population abundance and trends, as well as anthropogenic-caused mortality and serious injury rates are required to be made independent of post-delisting monitoring requirements of the ESA. Abundance and trend surveys are similarly conducted in British Columbia by DFO.

Post-Delisting Monitoring Requirements under the ESA

Section 4(g)(1) of the ESA requires that the National Marine Fisheries Service (NMFS),

> *...implement a system in cooperation with the States to monitor effectively for not less than five years the status of all species which have recovered to the point at which the measures provided pursuant to this Act [the ESA] are no longer necessary... .*

Additional guidance for monitoring plan development is provided by recommendations jointly developed by the U.S. Fish and Wildlife Service and NMFS (FWS 2008), and from the Steller sea lion Recovery Plan (NMFS 2008). In keeping with the ESA mandate, the NMFS developed this Steller sea lion post-delisting monitoring plan with solicitation for input from State wildlife agencies (States), Native American Tribal Nations and Alaska Native Organizations along the US Pacific Coast (Tribes), Fisheries and Oceans Canada (DFO), and other interested groups and cooperators. The plan has received extensive review by independent experts. A 30-day public comment period was opened with the publication of a Notice of Availability in the Federal

Register on XX YYYY 201x (ZZ FR ZZZZZ). The Federal Register notices and the draft plan will be posted on the NMFS Alaska Region Protected Species Division, Steller Sea Lion web page at the time of publication[1]. A revised final draft plan will be distributed within NMFS, to monitoring cooperators and to the States for review on XX YYYY 201x. The final version of the monitoring plan, and NMFS responses to comments on earlier versions, will be posted on the NMFS Alaska Region Protected Species Division Steller Sea Lion web page[1]. Any revisions and reports will also be available on this page.

While it is the mandate of the NMFS, in cooperation with States, to monitor the eastern DPS of Steller sea lion for not less than five years after delisting it should be clear from the outset that the NMFS itself will collect only a fraction of the data to fulfill that mandate. The successful implementation of this plan relies on a large number of existing Steller sea lion monitoring efforts designed and implemented by States, DFO, non-governmental organizations, the Tribes, and individuals. NMFS intends to support and facilitate these existing efforts. The result will be a collaborative network of governmental and non-governmental partners contributing to this broad regional effort. Ultimately, however, NMFS is responsible for the successful implementation of this monitoring plan.

Objective

This cooperative post-delisting monitoring plan for the eastern DPS of Steller sea lion has two primary goals. The first is to monitor the population to detect changes in trends in pup production and adult/juvenile (non-pup) counts, vital rates (survival and birth rates), and continue to assess how movement across the western-eastern DPS boundary may be affecting our perception of population trend in each DPS. The second is to monitor the various threats to the sustainability of the recovery the eastern DPS within its range. Data on population counts will be available from all regions (Southeast Alaska, British Columbia, Washington, Oregon and California), while vital rate studies are conducted in all regions except British Columbia (though observations are recorded of marked animals). Regional data for the population count measures will be combined to examine trends across the range of the eastern DPS. The NMFS will receive data collected by States, DFO, coastal tribes, and other agencies and partners along the US and Canadian Pacific coast, and will analyze these after each breeding season (summer) monitoring effort. If necessary, NMFS will propose adjustments to the sampling design.

The population monitoring component is designed to detect changes in abundance of the eastern DPS of Steller sea lion that might arise from a variety of monitored threats, including but not limited to entanglement in marine debris, incidental take in fisheries, disease, predation, and any degradation of important marine foraging habitats and terrestrial rookery and haul-out locations. Monitoring the eDPS population over a 10-year period gives a greater than 90% probability of detecting a -3% per year change in pup production and an 80% probability of detecting a -6% per year change in non-pup counts in the eastern DPS (Appendix A). If these data or other substantial information indicate that this species is experiencing significant decreases in pup production, non-pup counts, survival or birth rate, NMFS will initiate more intensive review or

[1] http://www.fakr.noaa.gov/protectedresources/stellers/default.htm

studies to determine the cause, and to determine whether or not to relist the species under ESA § 4(b)(7).

Implementation

The Protected Resources Division of the NMFS Alaska Regional Office has the lead for coordinating this monitoring effort. A NMFS team comprising a DPS (overall) Coordinator, Regional Coordinators, and monitoring collaborators was established to finalize and implement the monitoring plan (Appendices B and C).

The role of the DPS Coordinator is to:

- convene the team to finalize and update the monitoring plan, as needed;
- provide guidance to the Regional Coordinators;
- publish the Notice of Availability for the monitoring plan in the Federal Register and on the Endangered Species web sites;
- distribute the plan to the NMFS Director, Regional Directors, and also to the Assistant Directors for Endangered Species, State resource agency directors, DFO, and all cooperating research agencies;
- prepare interim and final reports;
- organize meetings as necessary to evaluate and plan monitoring efforts with Regional, State, and other cooperators;
- publish a Notice of Availability for the interim and final reports in the Federal Register and on the Endangered Species web sites;
- provide copies of interim and final reports to the NMFS Director, Regional Directors, and also to the Assistant Directors for Endangered Species, State resource agency directors, DFO, and all cooperating research agencies;
- make recommendations based on monitoring results;
- report each year to the NMFS Director, Regional Directors, and also to the Assistant Directors for Endangered Species, State resource agency directors, DFO, and all cooperating research agencies on the status of the monitoring plan;
- organize and submit regional budget requests to sources within the NMFS; and
- seek partnerships with other agencies to implement the plan.

The role of Regional Coordinators is to:

- establish or maintain a network of cooperators who monitor Steller sea lions and threats to their recovery within their Region;
- work with regional staff to plan, implement, and analyze the surveys, and summarize monitoring results in cooperation with States and other cooperators;
- participate in established regional working group meetings, or establish a regional working group, as necessary, to assist in the planning and implementation of the monitoring surveys;
- coordinate with tribes on monitoring activities on or near tribal lands;
- seek partnerships with tribes, governmental agencies and nongovernmental organizations to implement the plan;

- make recommendations to the monitoring team based on survey results;
- coordinate the collection and compilation of regional survey results;
- provide monitoring results to the DPS Coordinator for inclusion into the interim and final reports by January 31 each year;
- ensure that monitoring data are collected using methods that meet the requirements of this monitoring plan;
- determine budget requirements to carry out monitoring in their Region and help secure potential funding; and
- submit regional funding needs to the DPS Coordinator, and assist in distributing funds to the cooperators.

Population and vital rates monitoring already occurs at selected index sites throughout the range of the eastern DPS (with the exception of vital rates in British Columbia). Consequently, the role of the Regional Coordinators will be largely to insure that the plan is executed within their region. Regional coordinators have been working with, and will continue to work with, all of the cooperators leading these efforts both established and new. Regional collaborators are listed in Appendix B and are associated with the following state and regional agencies: Alaska Department of Fish and Game, Department of Fisheries and Oceans Canada, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, and the Marine Mammal Center.

Monitoring Methods

The Steller sea lion Recovery Plan recommended that post-delisting monitoring should be conducted for a period of 10 years, covering two sea lion generations (NMFS 2008). During the initial 10-year post-delisting monitoring period for the eastern DPS of Steller sea lion, NMFS will work with our research partners in the States and in British Columbia to:

- Monitor population trends (counts of pups and non-pups)
- Update estimates of survival and birth rate (branded animal sightings)
- Assess the impact that sea lion movement across the eastern DPS-western DPS stock boundary may have on our trend estimates for each stock (count, sighting and genetic data)
- Assess potential threats to continued recovery, including:
    - Entanglement in debris, such as packing bands, flashers, gangions, etc.
    - Incidental takes in fisheries
    - Direct takes (subsistence harvest)
    - Declines in abundance of important prey
    - Parasites, disease, contaminants and biotoxins
    - Predation, and
    - Degradation of terrestrial or marine habitats.

Population trends

At least three complete eastern DPS-wide surveys to assess pup production and to count adults and juveniles (non-pups) will be conducted during the 10-year monitoring period. The proposed schedule of pup and non-pup survey years in the eastern DPS corresponds with a similar (though more frequent) schedule in the Alaskan western DPS. NMFS will conduct surveys using high-resolution aerial photography in Southeast Alaska (NMFS-AFSC-NMML) and in California, Oregon, and Washington (NMFS-SWFSC, AFSC-NMML, WDFW). The States may conduct additional aerial surveys of Steller sea lion distribution and abundance during the breeding season and at other times of the year to document seasonal use of haul-out areas. DFO has proposed to continue to support aerial and vessel surveys every four years in British Columbia, and to consider additional rookery surveys every two years to monitor breeding populations (Fisheries and Oceans Canada 2010). NMFS proposes the following protocol for aerial surveys, subject to further coordination among the monitoring agencies:

- Surveys should be conducted in late June through early July (e.g., 24 June through 10 July) throughout the range of the eastern DPS in order to obtain breeding season counts of pups and non-pups. All rookeries and major haulouts should be surveyed for pups, while all known sites should be surveyed for non-pups with trend monitored at a series of consistently surveyed sites. Consideration will also be given to incorporating new sites that may become occupied during the breeding season. Survey dates are somewhat flexible, but it would be best to survey at consistent times to obtain comparable data. After mid-July, adults and pups disperse from rookeries making consistent counts of pups considerably more difficult.

- NMFS proposes that surveys be conducted late June-early July in 2013, 2017, and 2021 to match the schedule proposed by DFO in British Columbia

To evaluate the statistical power to detect an overall decline in the eDPS during a 10-year period based on the above survey schedule, a geometric Brownian motion model was fitted with abundance survey data presented in NMFS (2008) and augmented with 2009 survey data from Southeast Alaska, California, and Oregon, and with 2006 survey data from British Columbia (Appendix A). There are no major rookeries in Washington; the small pup production was not included in this power analysis. The model found an estimated power of a greater than 90% probability for detecting a reduction in growth rate of 3% per year in pup production, and an approximately 80% chance of detecting a 6% per year reduction for non-pups in the eastern DPS overall (Appendix A). This power is sufficient to detect a change in the eastern DPS overall in trend from an increasing to stable pup production, and for non-pups a change in trend from increasing to decreasing counts, meaning that regional non-pup counts would be declining between -1% to -4% per year. Though there are no regionally-based listing criteria under the ESA for the eDPS, the model further determined the statistical power to detect changes within management boundaries of cooperating State and foreign government management boundaries. The survey protocol has limited power to detect significant declines in regional pup production in all regions except Oregon. Only small gains in power to detect both regional and overall eastern DPS pup and non-pup trends are gained by doubling the sampling frequency to every two years (Appendix A). This model was developed solely to estimate the statistical power likely to be achieved in detecting declines in the eDPS overall following delisting. This use does not

dictate how future analyses might evaluate the population structure and trends of Steller sea lions in the eastern DPS.

Survival and birth rates

ADFG branded 1,995 pups born on four rookeries in Southeast Alaska (Forrester, Hazy, White Sisters and Graves Rock) from 2001 through 2005, and has used their sighting histories through 2009 to estimate age-specific survival through age 8-years old (Hastings et al. *2011*). Estimated survivorship (through 2009) is consistent with a population that is increasing. In addition, ODFW and NMML branded 1,154 pups born on two rookeries in southern Oregon and northern California (Rogue Reef and St. George Reef) from 2001 through 2009. ODFW and NMML will make preliminary estimates of juvenile and young adult survival in 2012 for comparison with ADFG estimates from Southeast Alaska, as well as the NMML estimates from the western DPS (all include data from observations collected in British Columbia waters). ADFG, ODFW and NMML will continue to monitor and update survival estimates through 2021, as well as estimate reproductive rate of branded adult females based on sightings as these become available. NMML, Makah Fisheries and WDFW will continue to monitor trends in pup production at Washington sites.

Movement across western-eastern DPS boundary

NMFS will continue to monitor the movement of juveniles and adults across the western-eastern DPS boundary at 144°W. This movement has the potential to affect the estimation of status and trend in both DPSs. In addition, a significant number of adult females born in the western DPS are now breeding on rookeries in northern Southeast Alaska (Graves Rock and White Sisters). These are among the newest rookeries in the eastern DPS (since 1990; others are in BC). NMFS and ADFG will monitor cross-boundary movement primarily through analysis of sightings of branded animals born on rookeries in both DPSs as well as those captured as juveniles, but also through counts of non-pups on rookeries and haul-outs at multiple times during the breeding season. Because there are no recent marked pup cohorts from Southeast Alaska or Seal Rocks (near Prince William Sound) rookeries, replicate surveys within the breeding season will help determine the origin and timing of sea lion movements between Prince William Sound and Southeast Alaska (Fritz et al. 2011). Aerial surveys in the Gulf of Alaska portion of the western DPS and in SE Alaska are proposed for every odd year beginning in 2013 through 2021.. In addition to a single survey pass of each site in these years, a replicate survey during at least one of these years will be conducted in Southeast Alaska (eastern DPS) and the eastern Gulf of Alaska (at least through the western tip of the Kenai Peninsula; western DPS). To address the extent to which adult females born in one DPS are giving birth on rookeries in the other, NMFS (with the assistance of the Alaska SeaLife Center) and ADFG will obtain genetic samples of pups on at least one occasion during the monitoring period from each of the following rookeries:

- Eastern DPS
    - White Sisters
    - Graves Rock
    - Biali Rock

- Western DPS
    - Seal Rocks
    - Wooded (Fish) Island
    - Chiswell Island

Threats

In the draft Status Review, NMFS (2012) reviewed each of the ESA listing factor criteria and concluded that in each case, there are no current or known threats likely to threaten the continued survival and recovery of the eastern DPS of Steller sea lions throughout its range for the foreseeable future. During the monitoring period, NMFS will continue to collect information about potential threats to aid in the understanding of population response in the event that either the status or trend of the eastern DPS changes. NMFS will:

- Monitor for unusual mortality events, via marine mammal stranding networks, including impacts from fishing gear and other human related materials (e.g., plastic bands, discarded fishing nets, flashers), or disease outbreaks. This will be done by NMFS in conjunction with our partners in the States, DFO, and through consultation and communication with the various coastal tribal nations the Marine Mammal Center, Sausalito, CA and other members of the stranding network. Marine Mammal Stranding Networks are coordinated through the NMFS Alaska, Northwest, and Southwest Regional Offices. Data on entanglement in fishing gear (e.g., net fragments, trolling gear, longline gear) or other marine debris (e.g., packing bands) will be collected by NMFS, NMML, ODFW, ADFG, Tribes and others during brand sighting surveys. This directly addresses listing factors B, C, and E.
- Monitor incidental takes in fisheries and aquaculture operations. This will be done by NMFS through fishery observer programs and through the Marine Mammal Authorization Program (MMAP) for commercial fisheries without observer programs. Monitoring will also be accomplished in conjunction with our partners in the States and DFO through fishery observer and other programs. Tribal fisheries operate on the northern Washington coast and Strait of Juan de Fuca under treaty rights, and are exempt from observer programs. Support for NMML and tribal partnerships to monitor these fisheries should continue. This directly addresses listing factors B and E.
- Monitor direct takes. In Alaska, NMFS will continue to support the monitoring and estimation of all takes related to subsistence harvest (currently, this being done by ADFG Division of Subsistence in cooperation with Alaska Native Organizations) and other direct takes. In addition, NMFS will coordinate with DFO and with the states of Washington, Oregon and California regarding any direct takes of Steller sea lions within their jurisdictions. This directly addresses listing factors B, C, and E.
- Monitor frequency and severity of Steller sea lion-human interactions in ports, harbors and inland waterways. This will be done by NMFS in conjunction with our partners in DFO, the Tribes and the States. This directly addresses listing factors B, C, and E.
- Monitor impacts of research activities. This will be done by NMFS in conjunction with our partners in DFO and the States. This directly addresses listing factors B, D and E.

- Monitor for disease and health related to contaminants. This will be done by NMFS in conjunction with our partners in the States, DFO, and through consultation and communication with the various coastal tribal nations and the Marine Mammal Center, Sausalito, CA. For example, ADFG will monitor the presence of hookworm infections of pups on mature rookeries (e.g., Lowrie Island) in Southeast Alaska, while the stranding network and the Marine Mammal Center and NMFS (NWFSC) will provide information on any possible influence of domoic acid poisoning from harmful algal blooms. This directly addresses listing factors C and E.
- Monitor the protection of important terrestrial habitat (rookery and haulout sites). This will be done by NMFS in conjunction with our partners in the States, DFO, and through consultation and communication with the various coastal tribal nations. This directly addresses listing factor A.
- Monitor the abundance, distribution and protection of important prey species. Nutritional stress can result in abrupt, precipitous declines, and as the EDPS continues to grow and attain and possibly overshoot carrying capacity, we can anticipate nutritional stress will affect population dynamics. Steller sea lions have emerged as a very important predator in coastal waters. In southern British Columbia and Washington, they now take as much salmon as the commercial fishery. There has never been a period in which well-developed fisheries and healthy sea lion populations have co-existed along the west coast of North America, and increased interactions and conflicts can be anticipated. This monitoring is currently being done by NMFS Sustainable Fisheries (for federally managed commercial prey species), DFO, the Tribes, and the States.
- Monitor the influence of predation. Killer whale abundance, distribution and diet studies targeting transients in Southeast Alaska and British Columbia will be conducted by NMFS and DFO during the monitoring period. This directly addresses listing factor C.

Data Evaluation

Review of Monitoring Data Relative to 'Response Triggers'

The NMFS, in cooperation with the States, will evaluate the monitoring results to determine whether or not the results suggest that a more detailed analysis of the status of the eastern DPS of Steller sea lion, the monitoring protocol, or both, is necessary. After each monitoring period, Regional Coordinators will work with the States to compile the monitoring results for their respective monitoring region, evaluate the results, and prepare a written assessment. This assessment will include a summary of the monitoring data, state whether any of the parameters fell below the "response triggers" shown below, determine whether or not the data collection protocols are functioning as anticipated and whether or not any changes are needed, and include an initial determination of any threats that may warrant further evaluation. In addition, the NMFS will analyze and summarize regional data it receives from States and other cooperators in the years between formal surveys.

In response to any significant issues, NMFS could:

- increase the sensitivity of the status and trend monitoring protocol to detect DPS-wide or regional declines in any of the parameters by, for example, increasing survey frequency;
- design research that would determine causes of changes in population trend or declines in pup production;
- work with States, tribes, or other entities to exercise their regulatory authorities to alleviate known or suspected threats;
- conduct regional or DPS-wide status assessment(s) to evaluate the significance of threats to the eastern DPS of Steller sea lion;
- evaluate proposing the eastern DPS of Steller sea lion for relisting under the ESA; or,
- evaluate whether or not to list the eastern DPS of Steller sea lion under the emergency provisions of the ESA.

The "response triggers" shown below would not automatically prompt a proposal to relist the eastern DPS of Steller sea lion under the ESA, because not all declines in population parameters or declines in productivity would indicate that listing under the ESA would be warranted. Environmental factors (e.g., El Niño-Southern Oscillation events) might cause temporary declines in pup production, juvenile survival, or both, particularly in the Washington-Oregon-California portion of the range, and in more than one monitoring season. Also, it is possible that there might be a natural reduction in productivity, and a decline in population growth rate as regional populations (particularly those in Southeast Alaska and British Columbia) reach carrying capacity. This may already be occurring on the older, larger rookeries in southern Southeast Alaska (Forrester Complex and Hazy Island) where growth in pup production since 1990 has been less than at the newer, smaller rookeries to the north (White Sisters, Graves Rock and Biali; Pitcher et al. 2007; NMML, unpublished). Should declines be noted either eDPS-wide or regionally, available information on natural causes (e.g., pup mortality caused by hookworm infection) as well as anthropogenic factors will be evaluated. Any relisting decision would be made by evaluating the status of the eastern DPS of Steller sea lion relative to the ESA's five listing factors [ESA § 4(a)(1)], though there are no regionally-based listing criteria.

Response Triggers

The "response triggers" listed below will, in addition to other factors described above, prompt an evaluation and appropriate response by the NMFS team of coordinators and collaborators (Appendix B), in consultation with international, national or regional experts, as necessary. The NMFS team will evaluate these triggers within each monitoring region and for all regions combined at the end of the 10-year monitoring period and at more frequent intervals as data become available:

- a change of < -3% per year in pup production or < -6% per year in non-pup counts for the overall eastern DPS of Steller sea lion;
- a reduction in sea lion survival from marked animal studies in Southeast Alaska, Oregon, and California, or new estimates of birth rate which indicate that the eastern DPS is responding to a new threat, an increase in a previously identified threat, or is at carrying capacity; and

- results of a population viability analysis indicating that the eastern DPS as a whole has declined such that it could be considered a candidate for re-listing under the ESA.

Reports

Under Section 117 of the MMPA, NMFS is required to update Marine Mammal Stock Assessment Reports annually for strategic stocks, and triennially for non-strategic stocks. Stock Assessment Reports (SARs) review the population status and trend, estimates mortality and serious injury rates due to anthropogenic causes, describes other factors that may affect stock status, and are prepared by AFSC in consultation with the Alaska Scientific Review Group (SRG; www.nmfs.noaa.gov/pr/sars/group.htm). Because of its threatened status, the eastern stock of Steller sea lions is considered strategic and depleted, and hence the SAR for that stock has been updated annually. If delisting the stock results in a change of designation under the MMPA, then the SAR for that stock will be updated every third year or more frequently if new information becomes available. Though published in the Alaska Marine Mammal Stock Assessment Reports, the SAR for the eastern DPS Steller sea lion also includes any available information from the British Columbia, Washington, Oregon, and California segments of the population. NMFS produces a report of counts obtained from each aerial survey, and for surveys in Alaska reports are available to the public through the web (www.afsc.noaa.gov/nmml/alaska/). These reports contain descriptions of the geographic survey area, methods and results of count estimates by haul-out, rookery, and area.

NMFS will issue a report with data summaries and analyses after each monitoring season; these will be available in printed form and posted on the NMFS Alaska Regional Office Protected Species Division website by March of the year following surveys. Reports will also suggest ways to improve sampling protocols or other aspects of the plan design if necessary. Reports might also be produced between years, as NMFS will annually request data collected by States and cooperators, for regional analyses of population health.

Each report will also comment on the status of the eastern DPS of Steller sea lion relative to the need for possible relisting. This plan has been devised to allow detection of population declines as well as increases in the magnitude of threats with reasonable certainty and precision. Statistical power will increase with successive monitoring seasons, as data from these seasons will likely be combined into larger sample sizes.

If changes in population counts or threat magnitudes become large enough to cause concern among the group of DPS and Regional Coordinators and NMFS Collaborators (Appendix B), then NMFS will consult with all regional collaborators (Appendix C) and any other identified partners, and make recommendations for future action to the Protected Resources Divisions of the NMFS Northwest and Alaska Regional Offices (see the Data Evaluation -Response Triggers section, above).

At the end of the 10-year monitoring period, NMFS will review all available information to determine if continuation of monitoring is appropriate. The decision to continue or end the monitoring program will be explained in the final monitoring report, which will be published in the Federal Register. If the eastern DPS of Steller sea lion is stable or increasing range-wide and

no significant threats are identified, then monitoring may be terminated, or a different monitoring program might be developed with cooperators.

Funding

Post-delisting monitoring is a cooperative effort between the NOAA Fisheries Service, State, tribal, and foreign governments; other Federal agencies; and non-governmental partners. Funding of post-delisting monitoring presents a challenge for all partners committed to ensuring the continued viability of the Steller sea lion following removal of ESA protections. To the extent feasible, the NMFS intends to provide funding for post-delisting monitoring efforts through the annual appropriations process. Nonetheless, nothing in this Post-delisting Monitoring Plan should be construed as a commitment or requirement that any Federal agency will obligate or pay funds in contravention of the Anti-Deficiency Act, 31 U.S.C. 1341, or any other law or regulation.

Acknowledgments

This monitoring plan was developed by the NOAA Fisheries Service in cooperation with State wildlife agencies, Fisheries and Oceans Canada (DFO) and other interested groups and cooperators. Comments on previous drafts received from these groups strengthened this plan in several ways. We also acknowledge the U.S. Fish and Wildlife Service, whose monitoring plan for the American Peregrine Falcon served as a template for this plan (U.S. Fish and Wildlife Service. 2003. Monitoring Plan for the American Peregrine Falcon, A Species Recovered Under the Endangered Species Act. U.S. Fish and Wildlife Service, Divisions of Endangered Species and Migratory Birds and State Programs, Pacific Region, Portland, OR. 53 pp.).

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Appendix A: Power to detect growth rate reduction in the eastern distinct population segment of Steller sea lion following removal from the list of threatened and endangered species under the ESA

MEMORANDUM FOR: Brian Fadely
CC: Lowell Fritz**,** Tom Gelatt
FROM: Devin Johnson
SUBJECT: Power for detecting growth rate reduction in Steller sea lion EDPS stock following ESA delisting
DATE: June 22, 2011

Summary. A geometric Brownian motion model was fitted to the eastern (EDPS) Steller sea lion stock abundance survey data from the 2008 recovery plan. Following model fit, the estimated parameters were used to simulate a hypothetical population in each EDPS region (SEAK, BC, OR, and CA) under various amounts of growth reduction due to delisting. Three sampling schedules were used (every year, every 2 years and every 4 years) within a 10 year window of post-delisting observation. The power to detect a reduction was assessed for both pups and non-pups in the stock as a whole and also for pups in each region separately. There seems to be sufficient power (~80%) to detect a 3% reduction in growth rate for the EDPS as a whole for pups, while a 6% reduction in growth rates is required to reach the same power for non-pups.

1. Methods

1.1. *Data*

The data used are those described in Section I.E. (Eastern DPS Status and Trend) of the 2008 revision of "Recovery Plan for The Steller Sea Lion" (http://www.alaskafisheries.noaa.gov/protectedresources/stellers/recovery/sslrpfinalrev030408.pdf) augmented with the 2009 survey data from the southeast Alaska, California, and Oregon regions, as well as 2006 data for British Columbia.

1.2. *Abundance model*

In each region (SEAK, BC, OR, CA) a geometric Brownian motion (GDM) model was fitted. The GBM model is described by the stochastic differential equation

$$dN_t = \mu N_t dt + \sigma N_t dW_t,$$

where N_t is the population size at time t, μ is the growth parameter, σ is a volatility parameter, and W_t is a Brownian motion process. The resulting solution given an initial population of size N_0 is

$$N_t = N_0 e^{(\mu - \sigma^2/2)t + \sigma W_t}.$$

The expected value of N_t is $N_0 e^{\mu t}$, so, $\lambda = e^{\mu}$ is the annual growth rate.

1.3. *Statistical inference*

In order to estimate parameters for the GBM model we make use of the following relationship

$$Y_{t+1} = \ln N_{t+1} - \ln N_t \sim Gau\left(\left(\mu - \frac{\sigma^2}{2}\right)\Delta_t,\ \sigma^2\Delta_t\right),$$

where $Gau(\cdot,\cdot)$ represents a normal distribution and Δ_t is the time difference between N_{t+1} and N_t. In addition, all the Y are independent. So, the negative log-likelihood is given by

$$\ell(\boldsymbol{\mu}, \boldsymbol{\sigma}; \mathbf{y}) = \sum_r \sum_t \left[\ln \sigma_r + \frac{\{y_{r,t} - (\mu_{r,t} - \sigma_{r,t}^2/2)\Delta_{r,t}\}^2}{2\sigma_{r,t}^2\Delta_{r,t}}\right],$$

where $y_{r,t}$ are the observed values of Y_t. The log-likelihood can then be maximized with respect to the $\boldsymbol{\mu}$ and $\boldsymbol{\sigma}$ parameters. The model was fit first in order to obtain μ and σ for each region which were used as baseline levels for future data simulation. Thus, the models fitted were $\mu_{r,t} = \mu_r$ and $\sigma_{r,t} = \sigma_r$ for r = 1,…,4.

In order to estimate power for detecting declines in growth rate, data were simulated for future surveys in each region. The growth rate was reduced by several percentage values from 1% to 10% (i.e., for 5% reduction, $\lambda_{\text{delist}} = 0.95\lambda$). At 10% reduction in growth rate, all of the regions would be severely declining (i.e., for a current 3% growth, a 10% reduction results in a new growth rate of -7%, 0.9*1.03 = 0.93). To assess the power to detect this stock-wide effect, one would fit a model with separate μ for each region and a "delist" covariate for all surveys after 2012. In terms of the model parameters the fitted model was

$$\mu_{r,t} = \mu_r + \mu_{delist} I(t > 2012)$$

and

$$\sigma_{r,t} = \sigma_r,$$

Where I(t>2012) is an indicator function for year > 2012 and $\mu_{delist} = \ln(1 - \%reduction)$. Even though there are separate growth parameters in each region, with 1 parameter, we can test for a significant global stock-wide reduction in growth rate. Data was simulated for survey schedules of every 1, 2, and 4 years with every region conducting a survey in 2012 (last pre-delisting survey). The BC region schedule was kept at a constant 4 year schedule. As mentioned before, declines were simulated for 1-10% growth rate reductions in intervals of 1%. For each of the 30 scenarios I simulated 1000 data sets, analyzed them with the GBM model with a delisting effect (i.e., year > 2012) and recorded whether there was a significantly (one–tailed) negative effect that was detected . The estimated power is the proportion of detected effects. The procedure was repeated for both the pup and non-pup surveys as well as for each region on its own for the pup surveys.

2. Results

2.1 *Pup production*

The model output is presented below.

```
Pup Geometric Brownian Motion Fit

Models:
--------
Drift   ~ region - 1
Volatility   ~ region - 1


              Mu Est. St. Err.   |Z| Prob. > |Z|
mu.regionBC     0.050    0.022 2.318       0.020
mu.regionCA     0.051    0.046 1.108       0.268
mu.regionOR     0.031    0.006 5.199       0.000
mu.regionSEAK   0.042    0.012 3.541       0.000


                Sigma Est. St. Err.    |Z| Prob. > |Z|
sigma.regionBC       -2.072    0.236  8.790           0
sigma.regionCA       -1.805    0.267  6.753           0
sigma.regionOR       -3.647    0.408  8.933           0
sigma.regionSEAK     -2.726    0.224 12.189           0


AIC = -26.883
```

The estimated growth rate in each of the regions for the time span of the current pup survey data is 5.1% (i.e., 100*exp{0.05}) for BC, 5.2% for CA, 3.1% for OR, and 4.3% for SEAK. The analysis of power for a stock-wide model of pup production is illustrated in Figure 1. There is an estimated power of >90% for detecting a stock-wide reduction in growth of 3% for each sampling schedule. A 3% reduction would result in growth rates of approximately 1.02 for BC and CA, 1.0 for OR, and 1.01 for SEAK. Thus, there seems to be sufficient power to detect a reduction I growth before the stock begins to decline. The results for each individual region are presented in Figures 2-5. The figures illustrate with the exception of OR, detecting significant declines in growth rate in each individual region has very little power using a 10 year window.

2.2 *Non pup trends*

The fitted GBM model for nonpup trends is presented below. Notice the generally larger process variance as was expected. The fitted growth rates are as follows: 3.8% for BC, 2.1% for CA, 5.8% for OR, and 2.2% for SEAK.

```
Nonpup Geometric Brownian Motion Fit

Models:
--------
Drift   ~ region - 1
Volatility   ~ region - 1


              Mu Est. St. Err.   |Z| Prob. > |Z|
mu.regionBC     0.037    0.014 2.648       0.008
mu.regionCA     0.021    0.073 0.280       0.779
mu.regionOR     0.056    0.033 1.668       0.095
mu.regionSEAK   0.022    0.045 0.483       0.629


                Sigma Est. St. Err.    |Z| Prob. > |Z|
sigma.regionBC       -2.509    0.236 10.645           0
sigma.regionCA       -1.357    0.250  5.428           0
sigma.regionOR       -1.798    0.147 12.194           0
sigma.regionSEAK     -1.588    0.204  7.780           0


AIC = -17.015
```

Figure 6 provides the results of the power analysis. There is an approximately 80% chance of detecting a reduction in growth of approximately 6%. A 6% reduction would result in growth rates of -1% to -4% within the various regions. Thus a sizable reduction in the growth rate (to the point of decline) is necessary to detect it within the 10 year window. It was surprising that there was very little additional gain in using a yearly sampling schedule versus every 4 years. In order to examine this effect in more detail, I looked at the Information matrix for the delist model. The Information matrix for a parameter vector is defined as

$$I(\theta) = -E\left[\frac{\partial^2}{\partial\theta^2}\log f(X;\theta)\right],$$

where *f* is the likelihood function. The Information for the single parameter μ_{delist} is given by

$$I(\mu_{delist}) = \sum_{r=1}^{4} \frac{\left\lfloor \frac{10}{s} \right\rfloor s}{\sigma_r^2},$$

where $\lfloor x \rfloor$represents the integer part of $x$and $s$is the schedule (e.g., s = 1, 2, or 4) . The details are left out, but straightforward differentiation of the previously presented negative log-likelihood will give the result. The quantity $\lfloor 10/s \rfloor$ is the number of added samples for each region after delisting. Thus, for s = 4 versus s = 1, there are only 20% ($= \lfloor 10/4 \rfloor/10$) of the samples, but we retain 80% ($= 4 * \lfloor 10/4 \rfloor/10$)of the information for estimating μ_{delist}. This result is intuitive after examination. In a regression setting the best placement of samples for estimating a simple linear trend $a + bx$ for x in [L, U] is to put half of the samples at L and half at U. The same holds here as we are essentially estimating a trend. The yearly schedule places many points in the middle of the 10 year range where they are not as useful. Power is not a direct function of information, but the simple analysis shows that intuition about sample size and

power is not always as straightforward as it seems, especially in this case.

FIGURES FOR STOCK-WIDE ANALYSIS

Figure 1. Stock-wide analysis of pup trend power

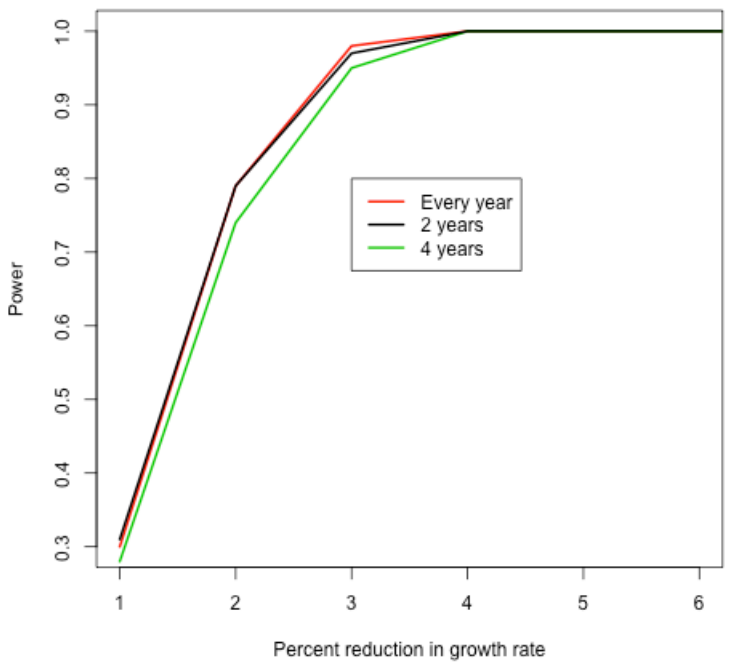
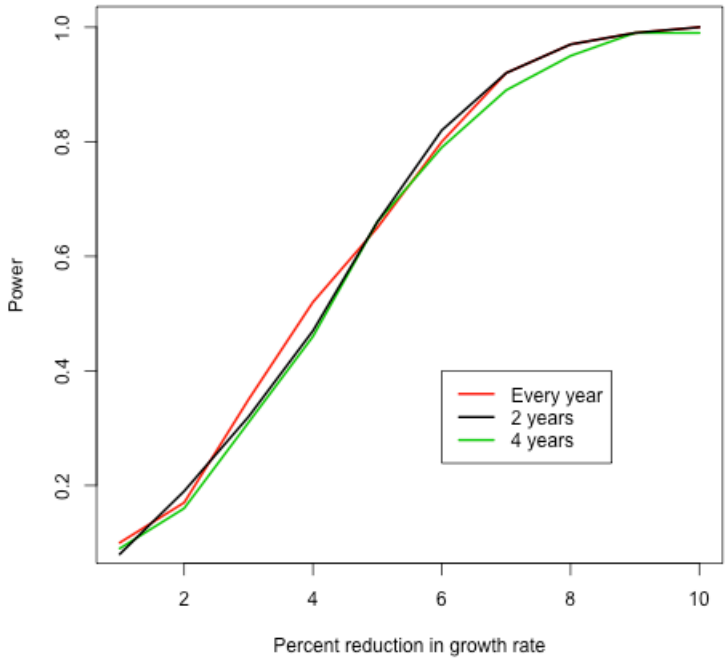


Figure 6. Stock-wide analysis of nonpup trend power



FIGURES FOR REGION BASED ANALYSIS OF PUP TRENDS

The pink line represents the current estimate of growth rate from the GBM model fit (1.051 for BC, 1.052 for CA, 1.031 for OR, and 1.043 for SEAK). The blue line represents stable growth. For BC only the 4 year schedule was used as this is their declared intention. The power represents the probability of detecting a significant reduction in growth rate following delisting.

Figure 2. Analysis of SEAK pup trend power

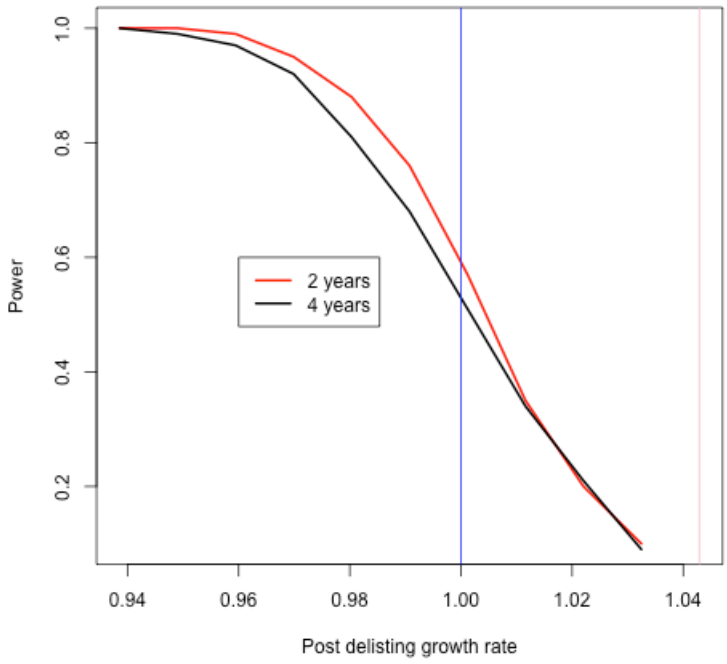


Figure 3. Analysis of BC pup trend power

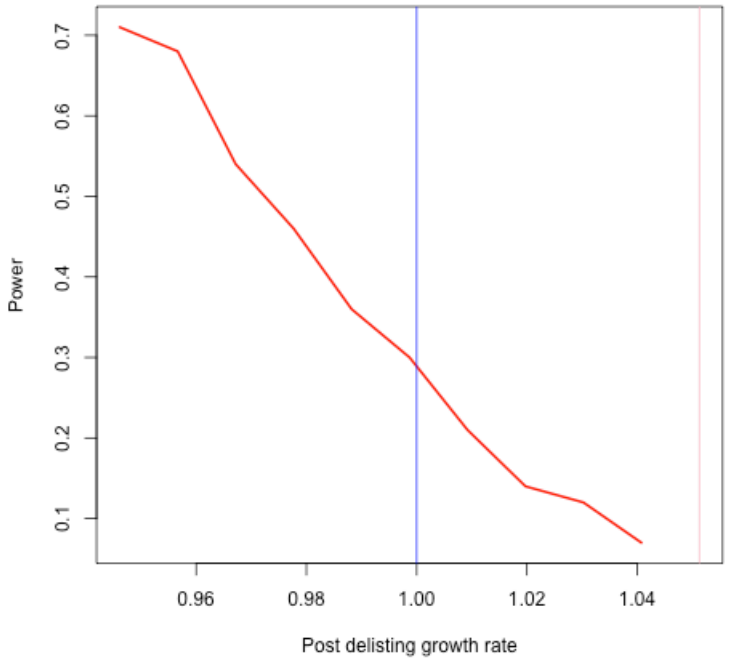


Figure 4. Analysis of CA pup trend power

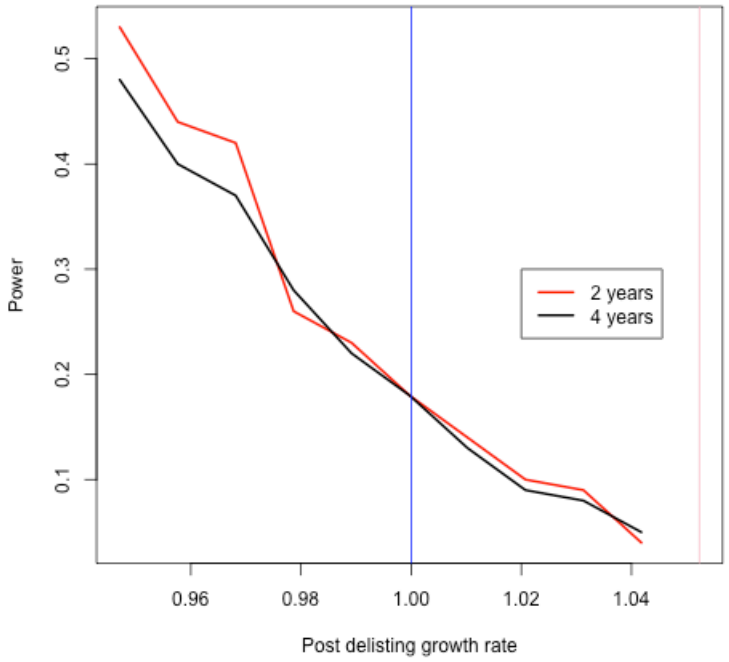


Figure 5. Analysis of OR pup trend power

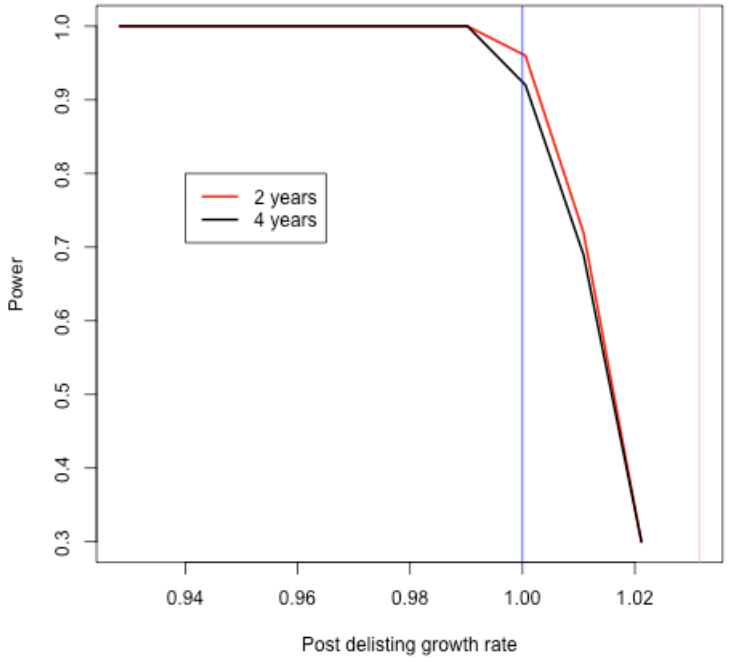


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Photo by Lauri A. Jemison, Alaska Department of Fish and Game. Research conducted under NOAA Permit No. 358-1769.